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Final Report

on

Raptor Study of Utah Oil Shale Area

By

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and

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Prepared for

Utah State Division of Wildlife Resources

and

The U. S. Bureau of Land Management

Contract 74 2753 - Studies for Wildlife on Utah Oil Shale Lands

30 November 1975

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Abstract

Title

RAPTOR STUDY OF UTAH OIL SHALE AREA

Authors

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Organizations

University of Utah, Salt Lake City, Utah
Natural History State Museum, Vernal, Utah

Abstract

A study of the raptors in the Utah oil shale area in northeastern Utah was made during the spring and summer of 1974 and 1975. Sixteen kinds of diurnal birds of prey were found. The most common species were, in the order of abundance, (1) the American Kestrel (Sparrow Hawk), (2) Red-tailed Hawk, (3) Golden Eagle, (4) Turkey Vulture, (5) Cooper's Hawk. Less common were the (6) Prairie Falcon, (7) Marsh Hawk, (8) Sharp-shinned Hawk, (9) Swainson's Hawk, (10) Ferruginous Hawk. All these are breeding species. The Osprey occurred in migration and the Goshawk, Rough-legged Hawk, Bald Eagle and Merlin in winter. One endangered species, the Peregrine, still occurs in the general area as an occasional migrant and rare breeder. The Peregrine is the only species for which there is evidence of a decline in numbers.

Eleven kinds of nocturnal birds of prey occur in the area. Only the Great Horned Owl is common. Other kinds are the Screech Owl, Pygmy Owl, Burrowing Owl, Long-eared Owl, Short-eared Owl, all in the oil shale area, and in the general peripheral area, the Barn Owl, Flammulated Owl, Snowy Owl, Spotted Owl and Saw-whet Owl.

For each species, seasonal status, relative abundance, records of occurrence and ecological data are given.

Descriptors

*Birds of prey, Raptors, Hawks, Eagles, Falcons, Owls, Ecology, Food relations, Nesting, Population density.

Identifiers

Oil shale area, Environmental impact study

Introduction

Contract provisions - On 1 July 1974 Contract No. 74 2753 became operational between the Utah State Division of Wildlife Resources and three subcontractors, namely William H. Behle and Arden R. Gaufin, consulting biologists and Professors of Biology at the University of Utah, Salt Lake City, and Michael L. Perry, consulting biologist and Director of the Natural History State Museum, Vernal, Utah, whereby certain studies of the fauna of the Utah Oil Shale lands situated in Uintah County, northeastern Utah, were to be made for the U. S. Bureau of Land Management. The contract was a tripartite agreement which not only outlined the various aspects of the general study to be made, but also spelled out the responsibilities among the several subcontractors for the various aspects of the study. William H. Behle and Michael L. Perry were commissioned to undertake the study of the raptors or birds of prey of the area. A progress report concerning this phase of the study was submitted as required on 1 January 1975 covering the period of observations from 1 July to 31 December 1975. The present report, which is the second and final report, covers the entire interval of the study. This was originally designated as from 1 July 1974 to 31 May 1975 but was subsequently extended six months to 30 November 1975.

Objectives of study - The purposes of the raptor study were as follows: (1) to ascertain what kinds of raptors occur in the Utah oil shale area, (2) to determine the seasonal status, relative abundance and habitat occupied by each kind, (3) to assess existing ecological conditions for raptors in the area. The data thus gathered were to constitute baseline data against which future changes could be measured--changes that will arise either directly or indirectly from industrial development of the oil shale resources and the attendant growth of the human population of the region. In meeting these

objectives it was specified that there should be (1) a records review or search of the literature for prior information on the occurrence of raptors in the region with any ecological items pertaining to them, and (2) a field inventory of the kinds presently occurring. The final report was to not only mobilize the data from all sources but also include an analysis of the data and make management recommendations.

Location of study area - The attachment to the contract entitled "Outline of a Cooperative Agreement for a Zoologic Resource Study in Areas in and Associated with the Utah Oil Shale Development Lands" which was part of the contract, describes the study area as consisting of lands in the White and Green river basin that contain oil shale yields of 25 gallons per ton. Further reference is made to two zones which occur in this area. So-called Zone 1, where the aquatic studies were to be made, extends along the White River from the Utah-Colorado border west to the Mountain Fuel Supply Company bridge across the White River which is located about 17 miles east of Ouray. The northern boundary of Zone 1 is the White River. The southern boundary is the east-west dividing line between townships 12 and 13. Thus Zone 1 includes the lower part of Evacuation Creek and its junction with the White River, and thence westward in sequence to Southam Canyon, Asphalt Wash, Atchees Wash and Bitter Creek (Two Water Creek). Zone 2 is referred to as the terrestrial zone. It embraces the area peripheral to Zone 1 and extends from the Utah-Colorado border west to the Green River, the settlement of Ouray and a little beyond. The map therein of the oil shales area shows that Zone 2 includes a strip north of the White river along its length in Utah including Bonanza and thence west to the Green River. The southern border of Zone 2 is also the dividing line separating townships 12 and 13. Our study of raptors covered the entire oil shales area but the region in Zone 1 along the White River with its cliffs and its extensive bottomlands was the most propitious portion in terms of raptor habitat.

Nature of the terrain - The so-called Utah Oil Shale area covers, according to Olsen (1973), about 1,200 square miles. The terrain can be characterized as rough, barren country. In its broad aspect it is in the nature of a gently sloping plateau. The area south of the White River is the East Tavaputs Plateau which slopes north to the White and Green rivers. The area to the north of the White River represents the southern part of the Uinta Basin where the drainage is south into the Green River. Here some true "badlands" occur. The area in the immediate vicinity of the White River has abrupt, high rising cliffs. Buttes and mesas occur throughout the region. The area is dissected by numerous deep canyons. The elevation along the White River is about 4,800 feet. The south rim of the East Tavaputs Plateau reaches about 8,000 feet above sea level. The direction of water flow of the White River is westward to the Green River. The confluence is located about one mile south of Ouray. The Green River flows in a southerly direction following a devious course.

Some species of raptors were found to occur throughout the entire area but the greatest concentration occurred along the White River. Even along the White River it was the middle stretch that supported the most raptors. The easternmost portion in Utah from the Utah-Colorado border west nearly to the Ignacio bridge on State Highway 45 about 3 miles south of Bonanza is fairly open country with, for the most part, sloping bluffs back from the river. This stretch is not especially good raptor country except in the immediate vicinity of the bridge at Ignacio where the extensive cottonwoods of the river bottomlands afford nesting sites for Great Horned Owls, Cooper's Hawks and Red-tailed Hawks. The middle portion of the White River from the Ignatio bridge west nearly to the Mountain Fuel Supply Company bridge is the best stretch with its high precipitous cliffs, extensive floodplains with riverine vegetation and numerous side canyons. The third, westernmost portion of the White River from just east of the Mountain Fuel Supply Company bridge to its

Nature of the terrain - The so-called Utah Oil Shale area covers, according to Dixon (1972), about 1,100 square miles. The terrain can be categorized as rough, barren country. In its broad aspect it is in the nature of a gently sloping plateau. The area south of the White River is the East Tavaputs Plateau which slopes north to the White and Green Rivers. The area to the north of the White River represents the southern part of the Uinta Basin where the drainage is south into the Green River. Here some true "badlands" occur. The area in the immediate vicinity of the White River has abrupt, high rising cliffs. Buttes and mesas occur throughout the region. The area is dissected by numerous deep canyons. The elevation along the White River is about 5,000 feet. The south rim of the East Tavaputs Plateau reaches about 8,000 feet above sea level. The direction of water flow of the White River is westward to the Green River. The confluence is located about one mile south of Ouray. The Green River flows in a southerly direction following a devious course.

Some species of raptors were found to occur throughout the entire area but the greatest concentration occurred along the White River. Even along the White River it was the middle stretch that supported the most raptors. The easternmost portion in Utah from the Utah-Colorado border west nearly to the Ignacio bridge on State Highway 45 about 4 miles south of Bonanza is fairly open country with, for the most part, sloping bluffs back from the river. This stretch is not especially good raptor country except in the immediate vicinity of the bridge at Ignacio where the extensive cottonwoods of the river bottomlands afford nesting sites for Great Horned Owls, Cooper's Hawks and Red-tailed Hawks. The middle portion of the White River from the Ignacio bridge west nearly to the Mountain Fuel Supply Company bridge is the best stretch with its high precipitous cliffs, especially in conjunction with riparian vegetation and numerous side canyons. The third, westernmost portion of the White River from just east of the Mountain Fuel Supply Company bridge to its junction with the Green River is not especially propitious country for raptors since the terrain opens out to a flat expanse. However, the extensive growth of cottonwoods in this portion constitute the habitat for owls and many small birds such as woodpeckers whose holes small owls utilize for nesting sites.

Materials and Methods

Our initial activity was to undertake the literature survey. About the same time we made a reconnaissance of the region in late May of 1974 to familiarize ourselves with the nature of the terrain, the geographic localities, and the extent of the oil shales area. We were also interested in roads that would afford accessibility to various parts of the region. We worked out a route to be travelled regularly in censusing the raptors. In this and subsequent field work we employed the usual paraphernalia such as field glasses, spotting scopes, maps, etc. We did not do any collecting since voucher specimens were not necessary and to remove specimens would interfere with the inventory process. All our observations were made from the ground or river. Three trips were made down the White River by canoe. Our ground surveys together with the canoe trips enabled us to cover all the major portions of the oil shale area.

The names used for the various species and the phylogenetic sequence employed follows that of the American Ornithologists' Union Check-list of North American Birds, 5th Edition, 1957, except for modifications adopted by the A.O.U. check-list committee in the supplement in The Auk 90, 1973: 411-419. Incidentally two more readily available and updated sources are the publications by Eyre and Paul (1973) and Behle and Perry (1975).

Seasonal status of each kind of raptor is expressed in terms of the categories specified in the contract, namely residents and migratory species, but under the latter are three designations: summer resident, winter visitant

and transient. Relative abundance is expressed by the designated terms, abundant, common, uncommon, and rare.

All nesting sites and localities where individuals of the various species were seen were plotted on maps. One of these maps accompanies each species account. In addition to enumerating the data obtained we have included records from the literature, museum specimens in the University of Utah laboratory of ornithology and field data from the files of that institution. A small amount of data was obtained by interviewing various people familiar with the region, such as falconers and government biologists. In presenting the distributional data obtained in our field work we have given the sites in terms of townships and section so as to permit accurate relocation of nesting sites for future follow-up studies.

Literature Survey and Resumé of Prior Studies

As pointed out by Olsen (1973) very few studies have been made of the biology of the general oil shale area and virtually none from zone 1. Twomey (1942) studied the birds of the Uinta Basin and Hayward (1967) studied the birds of the entire Upper Colorado River Basin (see also Hayward, Beck and Tanner (1958). Twomey's observations centered on the Ashley Creek marsh area near Jensen while most of Hayward's data was gathered in the Ouray area. Both of these locations are peripheral to the heart of the oil shale area. We have included in the literature cited several papers dealing with raptor studies elsewhere in the state for comparative purposes. These are papers by Porter and White (1973), Murphy, Caminzind, Smith and Weston (1969), Smith and Murphy (1973), Weston and Ellis (1968).

In searching the periodicals in ornithology (Auk, Condor, Wilson Bulletin) we found a few references to birds other than raptors for the general region. We have not included these data in the present report since our mission

pertained solely to studying the raptors. Olsen (1973) gave a summary of the birds of the region in his report. We have, however, included in appendix 1 a list of birds other than raptors that we observed in the oil shale area. It should be noted in passing that the general oil shale area is rich in kinds of birds for several reasons. One is the diversity of the biotic communities and habitats. Another is that the Green River and possibly the White River constitute a migratory lane for birds, so many transients pass through the region in spring and fall. Another is altitudinal migration where breeders from surrounding high elevations drop down into the lowlands for wintering. Several winter visitants move in from more northern regions. The number of kinds of birds occurring in the region and their habitat relations have been fairly well determined. However, no attempt has been made to obtain quantitative data for the various species other than for the raptors which are the subject of the present report.

Resumé of Field Work

As pointed out in our initial progress report, delay in the execution of the contract until 1 July 1974 meant the loss of observations for most of the 1974 nesting season for raptors. However, in anticipation of the study, we made a reconnaissance of the area on 24-25 May 1974 and field studies were carried on by one of us (Perry) throughout the summer and autumn of that year. A few visitations to the area were made during the winter of 1974-75. In the spring of 1975 the work was intensified again and continued throughout the summer of 1975. This second season of observation was made possible by the extension of the contract.

A number of roads afforded access to many portions of the oil shale lands but to thoroughly cover the area, as previously noted, three trips were made by canoe down the White River to census raptors and locate eyries. One trip was made in the spring of 1974 and two in the spring of 1975. In 1974 the stretch of the river and adjacent cliffs and side canyons extended from the

bridge at Ignatio, 3 miles south of Bonanza, to Ouray. Those for 1975 terminated at the Mountain Fuel Supply Company bridge about 17 miles east of Ouray.

A total of 62 man days were spent in the oil shale area in this raptor study. The following participated in the field studies. The figure following each name indicates the number of days each spent in the field: William H. Behle (4), James Blanchard (2), Tom Boner (10), William Pingree (2), Dave Prouse (10), Michael Perry (34). For the field work of 1974 and 1973 two land routes were worked out covering the most propitious areas for raptors. They were travelled repeatedly on a weekly basis throughout the summer and fall. The established land census routes were as follows.

Route 1 - Route 1 began at Ignatio Stage Stop at the White River, 3 miles south of Bonanza, and proceeded south 19 miles to Dragon; then west up Dragon Canyon, 6 miles to Atchee Ridge Road; then north on Atchee Ridge Road through Rainbow and Watson, and termination at beginning point, namely White River and Ignatio. Total distance travelled = 49 miles.

Route 2 - Commenced at Ignatio Stage Stop and proceeded south through Watson and Rainbow; then southwest along the Kings Well Road to Kings Well and Bitter Creek, a distance of 30.5 miles. From Bitter Creek corral the route proceeded north 7.5 miles. At this point the route retraced back to the junction of Kings Well Road and Asphalt Wash Road. It then proceeded north along Asphalt Wash to the White River, a distance of 11.4 miles. From the White River the route was retraced 1.6 miles to the Southam Canyon junction and then east through Southam Canyon 13.7 miles to the beginning point. Total distance travelled = 63 miles.

Route 3 - Was the River route which proceeded from the White River bridge at Ignatio Stage Stop down River to Mountain Fuel bridge, 27 miles. This was travelled four times. Although land routes 1 and 2 were travelled regularly for census data, all other possible roads were taken upon occasion and the areas investigated for the presence of raptors or eyries.

The field work for 1975 was centered more along the White River where most of the nesting seemed to take place on the cliffs or cottonwood groves of the bottomlands.

Biotic Communities

Three well defined biotic communities are represented in the oil shale area in Utah as follows.

1. Riparian woodland community - This occurs extensively along the river bottomlands of the White and Green rivers and to a lesser extent in major tributary canyons, especially where permanent streams exist. Major vegetative types represented are cottonwoods, willows, the nonnative tamarix or salt cedar along with numerous shrubs such as squawbush and wild rose which occupy the floodplains fairly close to the running water. The cottonwoods occur as scattered lone individuals, small clumps or broad, extensive groves. In the drier portions of the riverbottoms back from the riverine area desert shrub types occur. This community supports an abundance of bird life with a total of about 68 kinds recorded there. In terms of raptors we found the cottonwoods to be the most important feature through providing nesting and resting sites for several species, particularly Great Horned Owls and Cooper's Hawks. Old woodpecker holes are utilized by small owls. The accipiters not only find shelter in which to lurk before dashing out after their prey, but the abundance of avian species afford much food.

2. Desert shrub community - Other designations that have been used for this are mixed desert shrub community, upland desert shrub, salt desert shrub, sagebrush-greasewood type. The complexion of the community changes from area to area as edaphic conditions change. In the drier, alkaline river bottoms where there is a high water table, greasewood forms an extensive growth. Indeed in some areas it forms a distinctive zone between the riverine cottonwoods and the "badlands" back on the bluffs and rocky slopes. The major aspect

of the community is a mixture of shrubby types extensively distributed over the higher, drier slopes. The major types are shadscale, rabbit brush, horse brush, and spiny sage. Minor types are matchweed, bud sage, hop sage, silver salt brush and several species of cacti.

This community forms a belt that extends from roughly 4,500 feet up, in places, to 6,800 feet elevation. The shrubs grow on dry, valley-like floors of canyons, the sides of floodplains, on low hills and gently sloping terrain broken by gulleys and rock exposures. Much of the desert shrub terrain has been heavily overgrazed with exposure of bare soil and evidences of erosion.

The community is fairly rich in bird life, a total aggregation of about 33 kinds occurring. As regards raptors, the broad-winged, broad-tailed soaring types such as Red-tailed Hawks and Golden Eagles cruise widely over this community which affords many rodents that are used as food.

Juniper-Pinyon Woodland - This is a conspicuous floristic feature over much of the East Tavaputs plateau, ranging from about 5,000 to 7,000 feet elevation. On its lower border it is transitional with the desert shrub which often extends up as tongues and fills the intervening areas between stands of the pygmy conifers. Types of sage are especially prominent in open areas between the junipers and pinyon pines. This community type occurs on the sides of ravines, along ridges and covers the higher tablelands where the soil is gravelly. At its upper limits, mostly outside the oil shale area this belt merges with the Douglas fir and yellow pine forest. There are about a dozen species of birds that regularly occur in this formation with many more in migration. American Kestrels, Red-tailed Hawks and Great Horned Owls nest in this association. Other kinds forage throughout this pygmy forest.

Analysis of the Raptors Found in the Oil Shale Area

The data that we have gathered indicate that 16 kinds of diurnal birds of prey (hawks and eagles) occur in the oil shale area. There is one additional kind of hypothetical status. Eleven kinds of nocturnal birds of prey (owls) were found to occur. We have analyzed the data in various ways. The species are first listed in systematic order, then grouped on the basis of seasonal status, and finally on the basis of relative abundance.

Systematic List of Species of Raptors (Order Falconiformes) Known to Occur in the Oil Shales Area of Utah

I. Diurnal birds of prey - Vultures, Hawks, Eagles and Falcons

A. American Vultures: Family Cathartidae

1. Turkey Vulture: _Cathartes aura_ (Linnaeus). Summer resident

B. Hawks and Harriers: Family Accipitriidae

Bird Hawks or Accipiters: Subfamily Accipitrinae

2. Goshawk: _Accipiter gentilis_ (Linnaeus). Migrant

3. Sharp-shinned Hawk: _Accipiter striatus_ Vieillot.
   Permanent resident

4. Cooper's Hawk: _Accipiter cooperii_ (Bonaparte).
   Permanent resident

Broad-tailed broad-winged Hawks and Eagles: Subfamily Buteoninae

5. Red-tailed Hawk: _Buteo jamaicensis_ (Gmelin).
   Permanent resident

6. Swainson's Hawk: _Buteo swainsoni_ Bonaparte.
   Summer resident

7. Rough-legged Hawk: _Buteo lagopus_ (Pontoppidan).
   Winter visitant

8. Ferruginous Hawk: *Buteo regalis* (Gray).
   Permanent resident

9. Golden Eagle: *Aquila chrysaetos* (Linnaeus).
   Permanent resident

10. Bald Eagle: *Haliaeetus leucocephalus* (Linnaeus).
    Winter visitant

C. Harriers: Subfamily Circinae

11. Marsh Hawk: *Circus cyaneus* (Linnaeus).
    Permanent resident

D. Ospreys: Family Pandionidae

12. Osprey: *Pandion haliaetus* (Linnaeus).
    Transient

E. Falcons: Family Falconidae

-? Gyrfalcon: *Falco rusticolus* Linnaeus. Hypothetical

13. Prairie Falcon: *Falco mexicanus* Schlegel.
    Permanent resident

14. Peregrine Falcon: *Falco peregrinus* Tunstall

15. Merlin (Pigeon Hawk): *Falco columbarius* Linnaeus.

16. American Kestrel (Sparrow Hawk): *Falco sparverius*
    Linnaeus. Summer resident

II. Nocturnal Birds of Prey - Owls (Order Strigiformes)

A. Barn Owls: Family Tytonidae

1. Barn Owl: *Tyto alba* (Scopoli). Permanent resident

B. Typical Owls: Family Strigidae

2. Screech Owl: *Otus asio* (Linnaeus). Permanent resident

3. Flammulated Owl: *Otus flammeolus* (Kaup). Permanent resident

4. Great Horned Owl: *Bubo virginianus* (Gmelin). Permanent resident

5. Snowy Owl: *Nyctea scandiaca* (Linnaeus). Winter visitant

6. Pygmy Owl: *Glaucidium gnoma* Wagler. Permanent resident
7. Burrowing Owl: *Speotyto cunicularia* (Molina). Permanent resident
8. Spotted Owl: *Strix occidentalis* (Xantus). Permanent resident
9. Long-eared Owl: *Asio otus* (Linnaeus). Permanent resident
10. Short-eared Owl: *Asio flammeus* (Pontoppidan). Permanent resident
11. Saw-whet Owl: *Aegolius acadicus* (Gmelin). Permanent resident

Grouping on the Basis of Seasonal Status in the Oil Shale Area of Utah

I. Permanent residents

- A. Hawks
  - Sharp-shinned Hawk
  - Cooper's Hawk
  - Red-tailed Hawk
  - Golden Eagle
  - Marsh Hawk
  - Prairie Falcon
- B. Owls
  - Barn Owl
  - Screech Owl
  - Flammulated Owl
  - Great Horned Owl
  - Pygmy Owl
  - Burrowing Owl
  - Spotted Owl
  - Long-eared Owl
  - Short-eared Owl
  - Saw-Whet Owl

II. Summer residents (Hawks)

- Turkey Vulture
- Swainson's Hawk
- Ferruginous Hawk
- American Kestrel (Sparrow Hawk)

III. Transients (Hawks)

- Goshawk
- Osprey
- Merlin

IV. Winter visitants

Hawks

- Rough-legged Hawk
- Bald Eagle
- Gyrfalcon?

Owls

- Snowy Owl

V. Kinds occurring in summer (permanent residents and summer residents)

A. Hawks

- Turkey Vulture
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-tailed Hawk
- Swainson's Hawk
- Ferruginous Hawk
- Golden Eagle
- Marsh Hawk
- Prairie Falcon
- American Kestrel (Sparrow Hawk)

B. Owls

- Barn Owl
- Screech Owl
- Flammulated Owl
- Great Horned Owl
- Pygmy Owl
- Burrowing Owl
- Spotted Owl
- Long-earned Owl
- Short-eared Owl
- Saw-Whet Owl

VI. Kinds occurring in winter (permanent residents and winter visitants)

A. Hawks

- Sharp-shinned Hawk
- Cooper's Hawk
- Red-tailed Hawk
- Rough-legged Hawk
- Golden Eagle
- Bald Eagle
- Marsh Hawk
- Gyrfalcon?
- Prairie Falcon

B. Owls

- Barn Owl
- Screech Owl
- Flammulated Owl
- Great Horned Owl
- Pygmy Owl
- Burrowing Owl
- Spotted Owl
- Long-eared Owl
- Short-eared Owl
- Saw-Whet Owl

Raptors Grouped on Basis of Relative Abundance in the Oil Shale Area in Utah

A. Abundant Species

- American Kestrel (Sparrow Hawk)

B. Common Species

Hawks

- Turkey Vulture
- Cooper's Hawk
- Red-tailed Hawk
- Golden Eagle

Owls

- Great Horned Owl

C. Uncommon Species

Hawks

- Sharp-shinned Hawk
- Rough-legged Hawk
- Bald Eagle
- Prairie Falcon

Owls

- Long-eared Owl

D. Rare Species

Hawks

- Goshawk
- Swainson's Hawk
- Ferruginous Hawk
- Marsh Hawk
- Osprey
- Gyrfalcon?
- Peregrine Falcon
- Merlin (Pigeon Hawk)

Owls

- Barn Owl
- Screech Owl
- Flammulated Owl
- Snowy Owl
- Pygmy Owl
- Burrowing Owl
- Spotted Owl
- Short-eared Owl
- Saw-whet Owl

Endangered and Threatened Species

A. Endangered species

1. Peregrine Falcon
2. Southern Bald Eagle

B. Threatened with endangerment

1. Ferruginous Hawk
2. Osprey
3. Prairie Falcon
4. Burrowing Owl

Habitat Utilization

As regards the raptors occurring in the oil shale area in Utah six habitats are utilized. There are: Riparian Woodlands (riverine trees), Cliffs (bordering rivers), Ledges, Potholes, Desert scrub Vegetation and Pinyon-Juniper woodlands. Occupancy of these habitats species by species is indicated in the accompanying charts.

Table 1. Habitat Utilization for Foraging and Feeding by Diurnal Raptors

pecies	Riparian Woodlands	Desert Shrub	Pinyon-Juniper
urkey Vulture	High	Moderate	Low
oshawk	Low	Low	Low
harp-shinned Hawk	Moderate	Low	Low
ooper's Hawk	High	Low	Moderate
ed-tailed Hawk	Moderate	High	High
wainson's Hawk	Low	Low	Low
ough-legged Hawk	Low	Moderate	Moderate
erruginous Hawk	Low	Moderate	Moderate
olden Eagle	Low	High	Moderate
ald Eagle	Moderate	Low	Low
arsh Hawk	Low	Moderate	Low
sprey	Moderate	-	-
rairie Falcon	Moderate	High	Moderate
eregrine Falcon	High	Low	Low
erlin (Pigeon Hawk)	High	Low	Low
merican Kestrel	High	High	Moderate

Table 2. Habitat Utilization for Nesting by

Diurnal Raptors

Species	Riparian Woodlands	Cliffs (bordering rivers)	Ledges	Potholes	Desert Shrub	Pinyon-Juniper
Turkey Vulture	Low	High	High	Low	Low	Low
Goshawk	Low	Low	Low	Low	Low	Low
Sharp-shinned Hawk	Moderate	-	-	-	-	Low
Cooper's Hawk	High	-	-	-	-	Low
Red-tailed Hawk	High	High	Moderate	Low	-	Low
Swainson's Hawk	-	-	-	-	-	-
Ferruginous Hawk	-	-	-	-	Low	-
Golden Eagle	Low	High	High	-	-	Low
Marsh Hawk	-	-	-	-	Low (?)	-
Osprey	Low	Low	-	-	-	-
Prairie Falcon	-	High	High	High	-	-
Peregrine Falcon	-	High	High	High	-	-
American Kestrel	High	Moderate	Moderate	Moderate	Low	Low

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Table 3. Habitat Utilization for Foraging and Feeding by Nocturnal Raptors

Species	Riparian Woodlands	Desert Shrub	Pinyon-Juniper
Barn Owl	Low	Low	Low
Screech Owl	High	Low	Low
Flammulated Owl	Low	-	Low
Great Horned Owl	High	Moderate	Moderate
Snowy Owl	Low	Low	-
Pygmy Owl	Low	-	-
Burrowing Owl	Low	High	Low
Spotted Owl	Low	-	Moderate
Long-eared Owl	High	Moderate	Moderate
Short-eared Owl	Low	Low	Low
Saw-whet Owl	Low	-	-

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Denver, CO 80225

Table 4. Habitat Utilization for Nesting by

Nocturnal Raptors

Species	Riparian Woodlands	Cliffs (bordering rivers)	Ledges	Potholes	Desert Shrub	Pinyon-Juniper
Barn Owl	Low	Low	-	Low	-	-
Screech Owl	High	-	-	-	-	Low
Flammulated Owl	Low	-	-	-	-	Low
Great Horned Owl	High	Moderate	Moderate	-	-	Low
Pygmy Owl	Low	-	-	-	-	-
Burrowing Owl	-	-	-	-	Moderate	Low
Spotted Owl	Low	-	-	-	-	Low
Long-eared Owl	High	-	-	-	-	Low
Short-eared Owl	Low	-	-	-	-	-
Saw-whet	Low	-	-	-	-	-

Population Densities

Since our census data were gathered from two principal sources, namely the land routes and the river route, we have in the accompanying tables expressed the data for each source separately. However, we have also combined the data from these two sources to give a figure for the entire Utah oil shale area in terms of total square miles. This will perhaps afford a basis of comparison for population density figures in possible future studies as well as serve as a basis for comparison for other similar areas.

Table 5. Density of Diurnal Raptors for Utah Oil Shale Area

Species	Density Data					
	For land census routes (112 miles)		For river route (27 miles)		For total oil shale area (324 square miles)	
	Total No. of ind. seen	Ratio of ind. per mile of census route	Total No. of ind. seen	Ratio of ind. per linear river mile	Total No. of ind. seen	Ratio of ind. per square mile
Turkey Vulture	7	.06	16	.59	23	.07
Goshawk						
Sharp-shinned Hawk	1	.009	1	.04	2	.01
Cooper's Hawk			6	.22	6	.02
Red-tailed Hawk	16	.14	16	.59	32	.10
Swainson's Hawk	1	.009			1	.003
Rough-legged Hawk	4	.04	1	.04	5	.02
Ferruginous Hawk						
Golden Eagle	14	.13	17	.63	31	.10
Bald Eagle	1	.009	5	.19	6	.02
Marsh Hawk	5	.04			5	.02
Osprey						
Prairie Falcon	4	.04	4	.14	8	.03
Peregrine Falcon			1	.009	1	.003
Merlin (Pigeon Hawk)						
American Kestrel (Sp.Hawk)	39	.35	19	.70	58	.17

Table 6 Density of Nocturnal Raptors for Utah Oil Shale Area

Species	Density Data					
	For land census routes (112 miles)		For river route (27 miles)		For total oil shale area (324 square miles)	
	Total No. of ind. seen	Ratio of ind. per mile of census route	Total No. of ind. seen	Ratio of ind. per linear river mile	Total No. of ind. seen	Ratio of ind. per square mile
Barn Owl						
Screech Owl						
Flammulated Owl						
Great Horned Owl			2	.01	2	.04
Snowy Owl						
Burrowing Owl						
Spotted Owl						
Long-eared Owl	2	.02	2	.07	4	.01
Short-eared Owl	3	.01			3	.01
Saw-whet Owl						

Species Accounts

Diurnal Birds of Prey - Hawks

Turkey Vulture

Cathartes aura (Linnaeus)

Status - Common summer resident throughout the region. Individuals arrive in the oil shale area in late February or early March and remain until mid-October.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Eleven records (see accompanying distribution map): Atchee ridge road, R25E T12S Sec. 29, July 12, 1974; two birds, White River, R24E T10S Sec. 2, August 2, 1974; one-half mile south of Ignatio, R24E T10S Sec. 2, August 10, 1974; four birds, White River, R24E T10S Sec. 11; one bird, White River, R24E T10S Sec. 17, April 19, 1975; one bird, White River, R24E T10S Sec. 8, April 20, 1975; one bird, White River, R23E T10S Sec. 19, April 21, 1975; White River, R24E T10S Sec. 7, May 24, 1975; five birds, White River, R22E T9S Sec. 8, May 25, 1975.

Mark Strong reported one individual seen on a roadside bird survey between Bonanza and Rainbow on June 12, 1975. Five birds were seen along the White River, R24E T10S Sec. 17, by Phil Wagner in April 1975. On a trip down the White River Michael Horton saw several vultures in Cowboy Canyon, R25E T9S Sec. 27, in late May 1971.

B. From peripheral area: Three birds, White River, R21E T9S Sec. 1, June 5, 1975; Ouray Refuge, Green River, R20E T8S Sec. 27, July 17, 1974; seven birds, six miles east of Vernal on highway 40, August 17, 1974; White River, R22E T9S Sec. 27, R22E T9S Sec. 21, April 21, 1975. Wagner reports numerous sightings of vultures in the Merkley Park area north of Vernal and in Roosevelt, Duchesne County.

C. Data from literature and other sources: Twomey (1942: 375) found Turkey Vultures numerous along the Green River especially in the vicinity of Jensen where "forty or fifty birds often were seen feeding on a carcass." He further noted that vultures were seen at nearly every point in the Uinta Basin,

preferring arid ranch and farm areas but also flying along the river courses and up and down deep canyons. He found a nest four miles south of Jensen on June 3, 1937. It was located on the east side of the Green River on a rocky ledge fifty feet above ground on a perpendicular wall that was 60 feet high. Two eggs were just hatching. Twomey stated that ranchers reported vultures nesting in the cliffs along Hill Creek, Uinta Canyon, Antelope Canyon and the upper part of Ashley Canyon. He further reports that A. C. Lloyd saw a few vultures about the Ashley Creek Marsh during spring and summer of 1934 and 1935. Large numbers occurred after August 20.

For the general Upper Colorado River Basin, Hayward (1967: 22) states that his records extend from April through September and he suggested that the species leaves the area during the coldest parts of the winter. The check-list for the Ouray National Wildlife Refuge indicates that the Turkey Vulture is uncommon during spring, summer and fall and absent during the winter. Olsen (1973: 92) lists the vulture as uncommon which does not agree with our diagnosis.

Two specimens from the general area are in the University of Utah Laboratory of Ornithology collection, one from 2 miles north of Pine Spring, 40 miles southeast of Ouray, 7100 feet, taken on July 13, 1967; the other from Monument Ridge, 2 miles north P. R. Spring, 47 miles southeast of Ouray, 8100 feet, taken on July 14, 1966. Sight records by University of Utah field parties were obtained at the following localities: Pelican Lake, one on May 27, 1966, and four on July 22, 1967; one mile east of Ouray, July 17, 1967 (one); Monument Ridge, July 8, 1966 (ten) and July 13, 1966 (several); South Canyon, July 12, 1966 (four), July 1, 1967 (two), July 9, 1967 (one); junction South and Sweetwater canyons, July 13, 1966 (four); Mc Cook Ridge, July 13, 1966 (two); Mormon Ridge, July 25, 1966 (one); Weaver Reservoir, July 26-28, 1966 (two); 2 miles southeast Weaver Reservoir, July 21, 1967 (six); 5 miles north Weaver Reservoir, July 23, 1967 (one).

Trends - Presently common throughout the area and probably as common now as in the immediate past. As to the future, on the one hand, being conspicuous, slow moving, soaring forms, the species may suffer from indiscriminate shooting as a consequence of increased numbers of people in the region, but on the other hand it may be benefited through an enhanced food supply from more dead livestock, predators and road kills due to the same human factor.

Ecology -

A. Habitat preference: Turkey Vultures range widely throughout the region, occurring over lowland desert shrub, pinyon-juniper, scrub oak and the coniferous forest of adjacent high terrain. We found them most abundant over flatlands, especially where there was ranching and dry farming, but they were also numerous along the White River bottomland and floodplains. Indeed there seemed to be a correlation in that when they occurred abundantly in the river bottomland they were less abundant on the benchlands. A possible explanation is greater food availability at times in the river bottoms. Cattle and sheep graze and water along the river and several times we observed vultures feeding on carcasses in river bottomlands. Another possible explanation is greater proximity to perching and nesting sites in cliffs and trees in proximity to the White River. When perching they showed preference for trees having dead limbs or open branches, but they also utilized ledges and rock facements for resting. For nesting they prefer the shelter of either steep hillsides or cavities on precipitous cliff faces. Since soaring is so much a part of their behavior they frequent areas where there are wind and air convection currents.

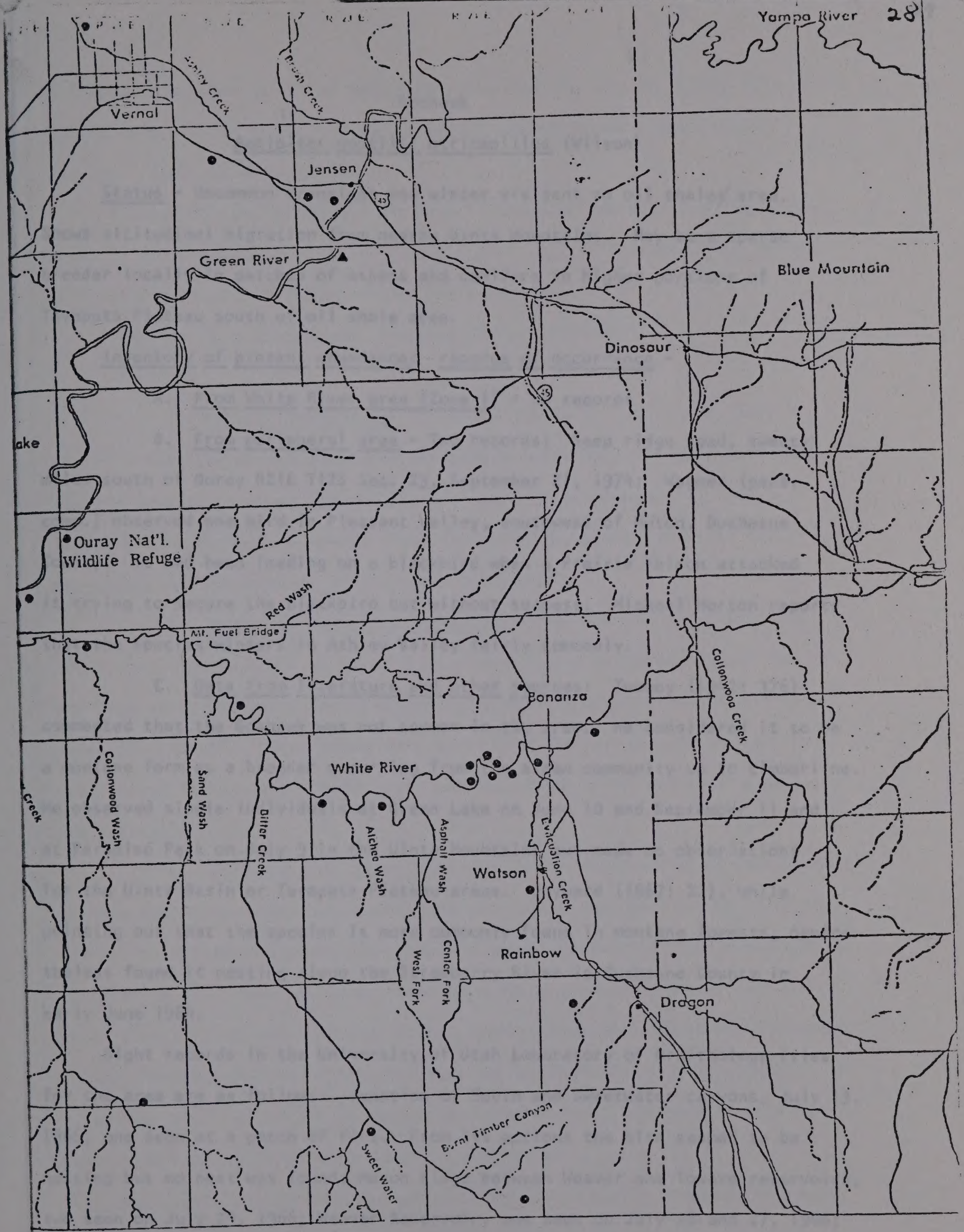
B. Number of nest site locations: We did not find any nests, so Twomey's observation constitutes the only nesting record for the general area that has come to our attention.

C. Food and food relations: Carrion of all sorts, from small rodents to large carcasses of livestock. May (1935) states that the Turkey

Vulture feeds almost exclusively upon carrion, as is shown by both field studies and examination of stomach contents. Bent (1937) states that this vulture has little preference in its choice of food. Unusual items eaten include skunks, snakes, newborn pigs, grasshoppers, pumpkins and fish.

D. Feeding sites and foraging areas in terms of habitat preference: Apparently none. They are wide-ranging opportunists, congregating wherever carrion is located.

E. Food availability: Judging from numbers of vultures seen, food is in abundant supply. Major sources are dead livestock, some sheep, but mostly cattle (see earlier prognostication re future).


Yampa River
Vernal
Ashley Creek
Brush Creek
Jensen
Green River
Blue Mountain
Dinosaur
ake
Ouray Nat'l.
Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Bonanza
Cottonwood Creek
White River
Cottonwood Wash
Creek
Sand Wash
Bitter Creek
Aichee Wash
Asphalt Wash
Evacuation Creek
Watson
Rainbow
West Fork
Center Fork
Dragon
Burnt Timber Canyon
Sweet Water

Map showing locations in the Utah oil shale area where the Turkey Vulture has been observed

Goshawk

Accipiter gentilis atricapillus (Wilson)

Status - Uncommon transient and winter visitant to oil shales area. Shows altitudinal migration from nearby Uinta Mountains. May be a sparse breeder locally in patches of aspens and conifers in higher portions of Tavaputs Plateau south of oil shale area.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1) - no records

B. From peripheral area - Two records: Seep ridge road, twenty miles south of Ouray R21E T12S Sec. 29, September 21, 1974; Wagner (pers. comm.) observed one bird in Pleasant Valley, southwest of Myton, Duchesne County. It had been feeding on a blackbird when a Prairie Falcon attacked it trying to secure the blackbird but without success. Michael Horton reports that the species winters in Ashley Valley fairly commonly.

C. Data from literature and other sources: Twomey (1942: 376) commented that the Goshawk was not common in the area. He considered it to be a montane form as a breeder occurring from the aspen community up to timberline. He observed single individuals at Green Lake on June 10 and September 11 and at Paradise Park on July 9 in the Uinta Mountains but made no observations for the Uinta Basin or Tavaputs Plateau areas. Hayward (1967: 22), while pointing out that the species is more commonly found in montane forests, nevertheless found it nesting along the Strawberry River in Duchesne County in early June 1964.

Sight records in the University of Utah Laboratory of Ornithology files for the area are as follows: Junction of South and Sweetwater canyons, July 13, 1966, one seen at a patch of firs. From its actions the bird seemed to be nesting but no nest was found; Mason Ridge between Weaver and Towave reservoirs, two seen on July 29, 1966; Weaver Reservoir, one seen on July 26 and 27, 1966;

two miles southeast of Weaver Reservoir, one seen on July 21, 1967, in a growth of aspen-fir trees. It was observed several times since it didn't fly far. Again no nest was found.

Michael Horton, falconer from Vernal, observed two adults along Willow Creek in late September 1974, more specifically, one at Cripple Creek and one at Sulphur Springs. The habitat was juniper-pinyon.

Trends - None determined, Probably always uncommon.

Ecology -

A. Habitat preference: Goshawks generally nest in the aspen-conifer community of the mountains but occasionally do so in the cottonwood riparian community along lowland rivers. During the nonbreeding season it ranges widely throughout wooded areas including the pygmy forest of the benchlands and cottonwoods of the river bottomlands.

B. Number of nest site locations: None for the oil shale area but Michael Horton knows of three active nests for northeastern Utah, two in the high Uinta Mountains near Flaming Gorge and one along Ashley Creek four miles from Vernal. Three young were taken from the latter nest in 1974 by boys living in the area. Mike later saw one of the birds and made a positive identification.

C. Food and food relations: Primarily birds but also many mammals. Mc Atee (1935) in itemizing stomach contents notes that poultry occurred in 116 of the 243 stomachs examined, roughed grouse occurred in 31, ptarmigan in 2, quail in one. Unusual items found were sharp-shinned hawk, screech owl, crow, herring gull and a pintail duck. Mammals consisted of squirrel remains in 22 stomachs, rabbits in 45, deer mice in 8, meadow mice in 8, woodchuck in 1, muskrat in 1, kitten in 1, weasel in 1, shrew in 1. In addition, grasshoppers and caterpillars were found in 4 stomachs.

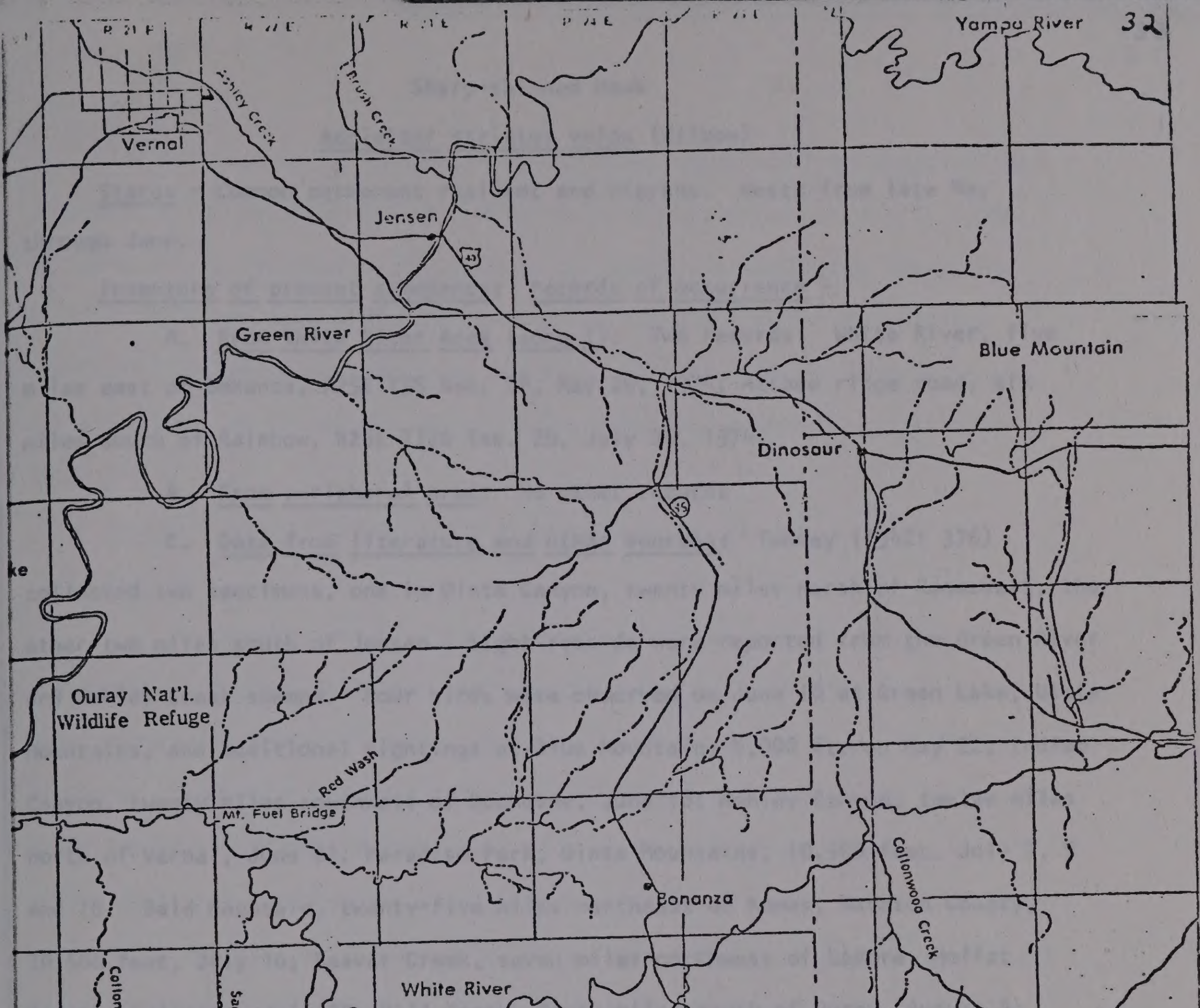
May (1935) states that the goshawk feeds principally on birds as shown by field studies and stomach examinations. The results of analysis of 881

stomachs yielded poultry or game birds in 447, other birds in 49, mammals in 233, other vertebrates in 2, insects in 3, and miscellaneous items in 8. In the sample empty stomachs numbered 168. May notes the following specific items of diet listed by J. J. Audubon: mallard, teal, black duck, Canada goose, roughed grouse, passenger pigeon, grackles, domestic fowl and domestic ducks.

Bent (1937) lists the following mammals, birds and insects having been recorded as eaten by Goshawks: rabbits, hares, muskrat, squirrels, chipmunk, kitten, weasels, lemmings, shrews, mice, murre, teal, woodduck, snipe, domestic poultry, quail, grouse, ptarmigan, pheasant, small hawks, owls, pigeons, doves, woodpeckers, crows, kingfisher, blackbirds, grackles, robins, sparrows, locusts, grasshoppers, beetles, and larvae of moths.

D. Feeding sites and foraging areas in terms of habitat preference: Goshawks forage widely and seemingly show little preference in either feeding sites or victims. Wooded areas are the most frequented because they afford protection while the hawk awaits for some potential prey species to appear.

E. Food availability: With such a diversified diet, their food is abundant in the oil shales area.


R 21 E
R 22 E
R 23 E
R 24 E
R 25 E
Yampa River
Ashley Creek
Brush Creek
Vernal
Jensen
40
Green River
Blue Mountain
Dinosaur
45
Ouray Nat'l. Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Cottonwood Creek
Bonanza
White River
Cottonwood Wash
Sand Wash
Ditter Creek
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
Center Fork
West Fork
Rainbow
Dragon
Burnt Timber Canyon
Sweet Water
ke

Map showing locations in the Utah oil shale area where the Goshawk has been observed

Sharp-shinned Hawk

Accipiter striatus velox (Wilson)

Status - Common permanent resident and migrant. Nests from late May through June.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Two records: White River, five miles east of Bonanza, R25E T9S Sec. 28, May 26, 1974; Atchee ridge road, six miles south of Rainbow, R25E T12S Sec. 20, July 26, 1974.

B. From peripheral area: No other records

C. Data from literature and other sources: Twomey (1942: 376) collected two specimens, one in Uinta Canyon, twenty miles north of Roosevelt, the other two miles south of Jensen. Sight records were reported from the Green River and Ashley Creek swamps. Four birds were observed on June 10 at Green Lake, Uinta Mountains, and additional sightings at Blue Mountain, 8,000 ft. on May 22; Indian Canyon, twenty miles southwest of Duchesne, June 18; Ashley Canyon, twelve miles north of Vernal, June 22; Paradise Park, Uinta Mountains, 10,500 feet, July 7, 9 and 10. Bald Mountain, twenty-five miles northeast of Kamas, Wasatch County, 10,500 feet, July 16; Beaver Creek, seven miles northwest of Ladore, Moffat County, Colorado, July 25; Hill Creek, forty miles south of Ouray, August 5; Strawberry Reservoir, August 17; and Uinta Canyon, twenty miles north of Roosevelt on August 28, all in 1937. Behle and Ghiselin (1958: 3) had one sight record at timberline at McPheters Lake, 10,800 ft. Summit County, September 5, 1955.

Hayward (1967: 22) saw one at Ouray on September 23 and indicates that there are specimens in the collection of Brigham Young University from Strawberry River at Timber Canyon, Duchesne County, June 19, 1957; Roosevelt, Duchesne County, February, 1956; Ouray, Uinta County, September 23, 1961. Olsen (1973: 110) lists the sharp-shinned as a probable resident but this is not substantiated with any data. The sharp-shinned is not included on the check-list of birds for the Ouray Refuge.

One specimen is in the University of Utah collection from Mormon Ridge, 3 miles N.E. Weaver Reservoir and 57 miles S. Ouray, taken on July 25, 1966. In addition one was seen at the junction of South and Sweetwater canyons on July 13, 1966, and one at Towave Reservoir on July 25, 1967. Mike Horton considered the species uncommon in the basin but did have two records in the oil shale area in pinyon-juniper two miles southwest of Dragon during June 1967.

Trends - None evident. Still a common species in the area.

Ecology -

A. Habitat preference: A wide ranging species occurring most abundantly in higher elevation woodlands including riparian growths, yellow pine, spruce-fir forests, aspens, but also found occasionally at low elevations in wooded floodplains. Twomey (1942: 376,377) observed sharp-shins foraging along the dense willows of the Green River and the Ashley Sloughs up to 10,500 feet at Bald Mountain, Wasatch County. Hayward (1967: 22) states that his fifteen records for the Upper Colorado Basin all come from wooded habitats along stream bottoms within the Upper Colorado River Basin. Most nests that he observed were in trees bordering water. Of our two records from the oil shale area, one was in the woodlands bordering the White River, the other in the Pinyon-Juniper belt near Mc Cook Ridge.

B. Number of nest site locations: None for the oil shale area, even though "good" habitat existed along the White River.

C. Food and food relations: Mostly small birds but some mammals. One of the birds that we observed was in pursuit of a Yellow-rumped Warbler. May (1935) states that this small hawk feeds unquestionably on birds and cites Audubon as reporting various sizes of birds taken ranging from the smallest warbler up to young chickens. Unusual food items given were a wood duck and a black-crowned night Heron. May summarizes the results of an analysis of 1030+ stomachs as follows: mammals in 28, poultry or game in 16+, other birds

in 844, insects in 45 and empty stomachs 106+.

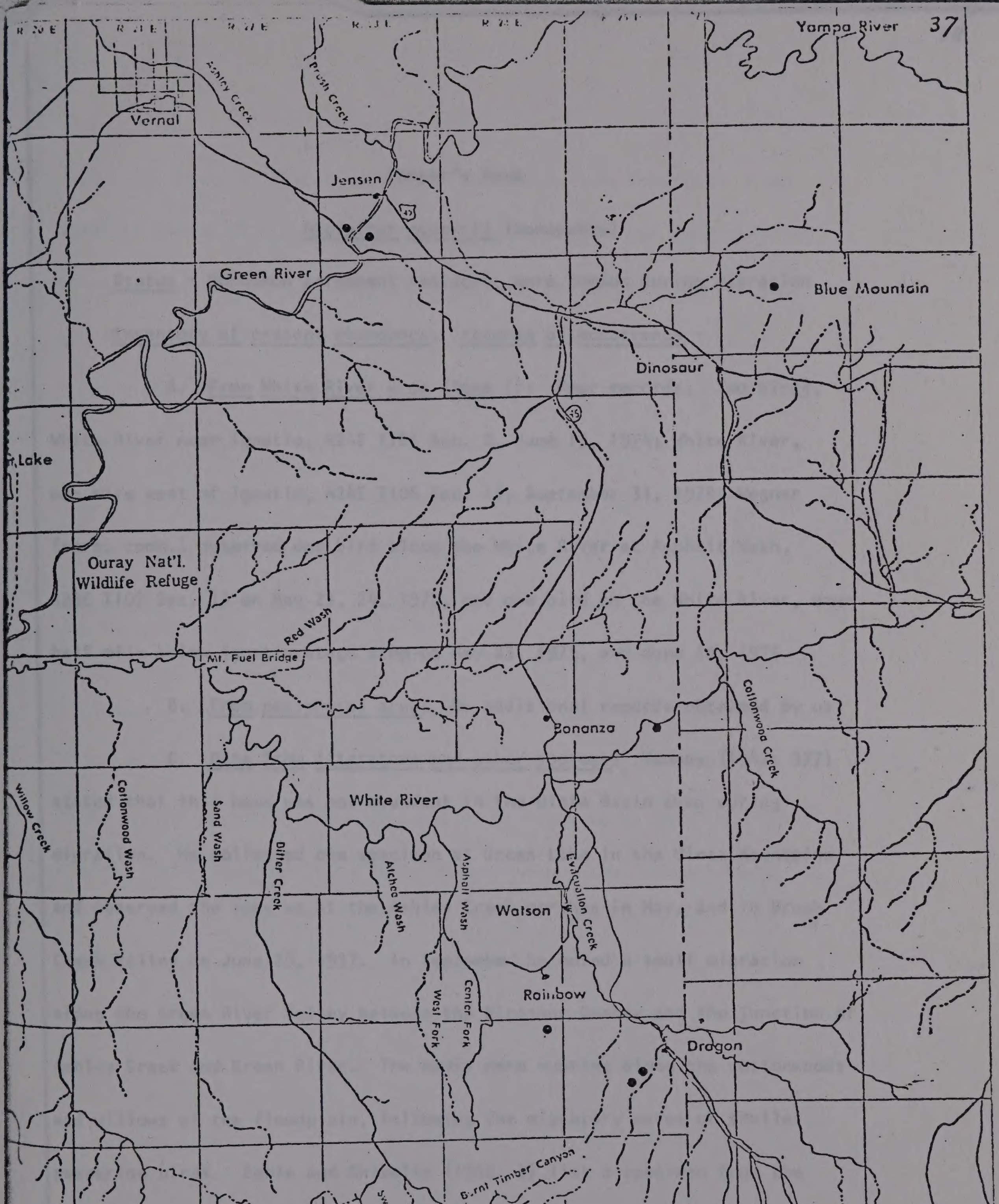
Mc Atee (1935), in reporting on the contents of 944 stomachs states that the remains of poultry were found in only two and game birds in only 5. Of these, 4 were of quail and 1 was a woodcock. Corresponding with their greater abundance, sparrows were the kinds of birds most frequently taken. A breakdown of these is as follows: song sparrows and allies in 82, house sparrow in 45, chipping sparrows and allies 45, towhees 38, sharp-tailed sparrows (4 genera) 19, crowned (Zonotrichia) sparrows 16, juncos 16, vesper sparrows 15, purple finches 14. In addition warblers were heavily levied upon: members of the genus Dendroica 175, ovenbirds and allies 29, yellowthroats 15, Wilsonia warblers 10. Other birds taken were robins 56, bluebirds 13, related thrushes 47, vireos 44, swallows 29. The blackbird group was fairly well represented, although some, such as meadowlarks, are larger than the average-sized prey for this hawk. The largest birds revealed in this study were as follows (excluding poultry previously noted): sparrow hawk, mourning dove and band-tailed pigeon, each identified in a single stomach. Mammals eaten were meadow mice in 8 stomachs, deer mice 16, house mouse 1, bats 2, shrew 1, squirrel 1, rabbit 1.

Bent (1937) states that the diet of the sharp-shinned hawk includes a few mice, young rabbits, shrews, bats, frogs, lizards, locusts, grasshoppers, crickets, caterpillars, large moths, butterflies and beetles; but the principle food is birds among which the following kinds have been recorded: some sandpipers, woodpeckers, swifts, flycatchers, horned larks, cowbirds, orioles, blackbirds, grackles, jays, meadowlarks, towhees, juncos, many warblers, many sparrows, mockingbirds, thrushes, catbirds, wrens, nuthatches, chickadees, creepers, kinglets, robins, thrushes, bluebirds.

D. Feeding sites and foraging areas in terms of habitat preference: The species forages widely and seems to show little preference in feeding areas

or species utilized as food. As in the case of the other accipitors the most obvious preference is for wooded areas adjacent to clearings where the hawks lurk on the edges waiting to dart out and obtain their prey. The combination of short rounded wings and long narrow tail enhance maneuverability in the chase through clearings.

E. Food availability: In abundant supply.


Yampa River
Vernal
Ashley Creek
Brush Creek
Jensen
Green River
Blue Mountain
Dinosaur
Lake
Ouray Nat'l. Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Bonanza
Cottonwood Creek
White River
Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
Center Fork
West Fork
Rainbow
Dragon
Burnt Timber Canyon
Sweet Water

3. Map showing locations in the Utah oil shale area where the Sharp-shinned Hawk has been observed

Cooper's Hawk

Accipiter cooperii (Bonaparte)

Status - Uncommon permanent resident, more common during migration.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Four records: Two birds, White River near Ignatio, R24E T10S Sec. 2, June 15, 1974; White River, one mile west of Ignatio, R24E T10S Sec. 11, September 31, 1974; Wagner (pers. comm.) observed one bird along the White River at Asphalt Wash, R23E T10S Sec. 13 on May 23, 24, 1975, and one bird on the White River, one-half mile below Ignatio stage stop on May 23, 1975, and June 10, 1975.

B. From peripheral area: No additional records obtained by us.

C. Data from literature and other sources: Twomey (1942: 377) stated that this hawk was not abundant in the Uinta Basin even during migration. He collected one specimen at Green Lake in the Uinta Mountains and observed the species at the Ashley Creek marshes in May, and in Brush Creek Valley on June 29, 1937. In September he noted a small migration along the Green River Valley between the Dinosaur Quarry and the junction of Ashley Creek and Green River. The hawks were hunting along the cottonwoods and willows of the floodplain, following the migratory waves of smaller passerine birds. Behle and Ghiselin (1958: 3) list a specimen from the Vernal Game Farm, 3 miles south of Vernal, taken September 10, 1948. Hayward

(1967: 22) does not give any specific records for the Tavaputs Plateau area but states that the species is common throughout the Upper Colorado River Basin. He hypothesized that it probably nests earlier than the Sharp-shinned Hawk.

Olsen (1973: 92, 110) lists the species as an occasional resident and suggests that the species is a probable breeder. Eyre and Paul (1973) state that the species has been observed during the breeding season in Desolation Canyon of the Green River. Wagner (pers. comm.) reports the species occurring north of Vernal in the Dry Fork area.

Field parties from the University of Utah have obtained sight records of Cooper's Hawks as follows: One seen at Ouray National Wildlife Refuge on March 19, 1966; one at Weaver Reservoir on July 24, 1966; one at P. R. Spring on July 6, 1967, and two in East Canyon on July 11, 1967. Michael Horton observed one along the White River near Cowboy Canyon, R25E T9S Sec. 27 in late May 1971 and reported that the species nests in Boxelder trees along Willow Creek south of Ouray.

Trends - No evidence of any changes in population density through the years.

Ecology -

A. Habitat preference: Generally occur in wooded areas along valley streams, especially in dense groves near springs; also occasionally in submontane shrub and upper elevation forests. In the oil shale area we found the species in riparian woodlands along the White River. The stands of cottonwoods afforded nesting sites.

B. Number of nest site locations: One along White River at R24E T10S Sec. 2. Two young were in the nest on June 9, 1975.

C. Food and food relations: May (1935) states that the Cooper Hawk is a confirmed bird-eater, like the Sharp-shinned Hawk. Its larger size makes it more destructive of poultry and game species. He gives the results of analysis of 422 stomachs as follows: poultry or game birds in 18, other birds in 146, mammals in 65, insects in 5, empty stomachs 129. May also summarizes a study by F. C. Pellett in 1912 of food items brought to a nest. During the first two weeks poultry, pigeons and small birds were brought in to the young and later ground squirrels appeared. Unusual items reported were minnows, snakes and other reptiles, grasshoppers and crickets and a little blue heron.

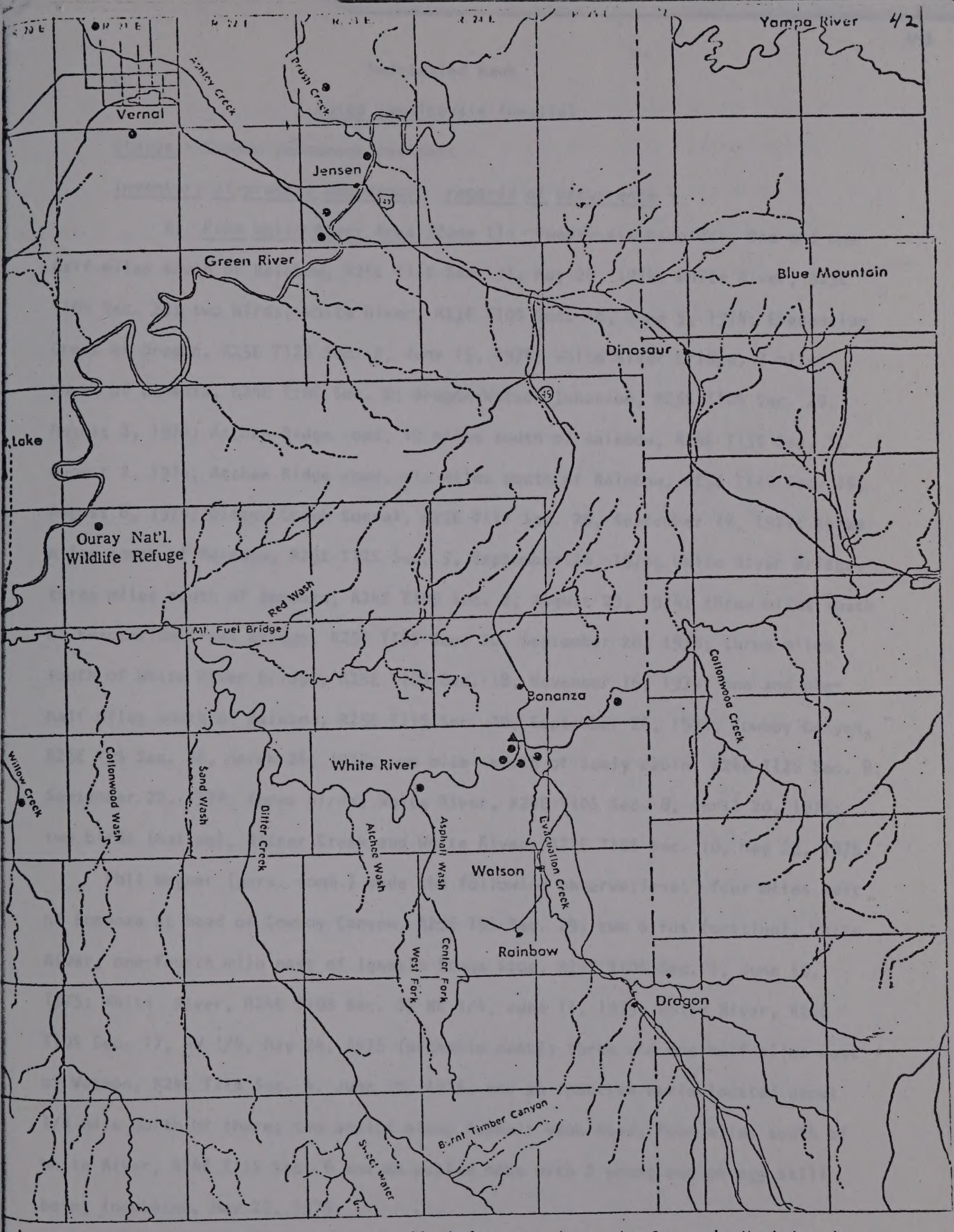
Mc Atee (1935) reported on the contents of 261 stomachs. Included were the following large birds: poultry remains in 32, quail in 16, pheasant in 10, grouse in 4, partridge in 1. Among the small birds taken were sparrows and their allies in 84 stomachs. In the category of small birds the most numerous were song sparrows (Melospisa) in 24 stomachs and house sparrows (Passer) in 17. Other representatives were towhees, juncos, crowned sparrows (Zonotrichia) and chipping sparrows. Woodpeckers appeared in 11. Seven of these were flickers. Occasionally found were blackbirds, thrushes and robins. Mammals included meadow mice in 8, house mouse in 2, Norway rat in 1, cotton rat in 1, squirrels in 22, rabbits in 4. Snakes, lizards and frogs made up a small portion of the

diet as did grasshoppers, crickets, beetles and butterflies. Unusual items reported were the least bittern, screech owl, pigeon hawk and sparrow hawk. The last three are examples of large raptors taking smaller raptors.

Bent (1937) dwells on the destructiveness of Cooper's hawks on poultry and domestic pigeons. Based on an analysis of 133 stomachs and crops he notes the following items taken: poultry in 33, other birds in 52, mammals in 11, frog in 1, lizards in 3, insects in 2, and 99 empty. Among the wild birds taken were teal and other young ducks, least bitterns, snipes, screech owls, quail, partridges, grouse, doves, flickers, blackbirds, jays, meadowlarks, woodpeckers, grackles, numerous species of sparrows, towhees, warblers, vireos, nuthatches, thrashers, catbirds, robins and thrushes. Mammals include rabbits and hares, opossum, various squirrels, rats and mice. He notes that Cooper's hawks sometimes eat snakes, lizards, frogs, grasshoppers, crickets, beetles, butterflies and moths.

D. Feeding sites and foraging areas in terms of habitat preference: The White River bottomlands support many passerine birds which serve as prey species for this hawk. As in the cases of the other accipiters, there is the requirement of wooded areas for the hawks to lurk in while awaiting whatever birds come along.

E. Food availability: In light of the broad-spectrum diet of the hawk and an abundance of birds the inference is that food availability is high.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Willow Creek
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Sand Wash
Bitter Creek
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
Rainbow
West Fork
Center Fork
Dragon
Burnt Timber Canyon
Sweetwater

4. Map showing locations in the Utah oil shale area where the Cooper's Hawk has been observed. Round spots indicate locations where the species was seen; triangle indicates a nesting site.

Red-tailed Hawk

Buteo jamaicensis (Gmelin)

Status - Common permanent resident

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Twenty-six records: One and one-half miles south of Rainbow, R25E T11S Sec. 31, May 26, 1974; White River, R23E T10S Sec. 23; two birds, White River, R23E T10S Sec. 18, June 5, 1974; Evacuation Creek at Dragon, R25E T12S Sec. 2, June 15, 1974; White River bridge, 3 miles south of Bonanza, R24E T10S Sec. 2; Dragon-Watson junction, R25E T10S Sec. 20, August 2, 1974; Atchee Ridge road, 13 miles south of Rainbow, R24E T13S Sec. 1, August 2, 1974; Atchee Ridge road, six miles south of Rainbow, R25E T12S Sec. 19, August 8, 1974; Bitter Creek Corral, R22E T11S Sec. 26, September 14, 1974; three miles south of Rainbow, R25E T12S Sec. 5, September 26, 1974; White River Bridge, three miles south of Bonanza, R24E T10S Sec. 2, August 23, 1974; three miles south of Evacuation Creek bridge, R25E T10S Sec. 20, September 28, 1974; three miles south of White River Bridge, R25E T10S Sec. 18, November 16, 1974; one and one-half miles south of Rainbow, R25E T11S Sec. 30, September 26, 1974; Cowboy Canyon, R25E T9S Sec. 28, March 26, 1975; one mile south of Seely cabin, R24E T12S Sec. 8, September 22, 1974; three birds, White River, R24E T10S Sec. 8, April 20, 1975; two birds (mating), Bitter Creek and White River, R22E T10S Sec. 10, May 23, 1975.

Phil Wagner (pers. comm.) made the following observations: four miles east of Bonanza at head of Cowboy Canyon, R25E T9S Sec. 29; two birds (nesting), White River, one-fourth mile east of Ignatio Stage Stop, R24E T10S Sec. 1, June 10, 1975; White River, R24E T10S Sec. 17 NE 1/4, June 11, 1975; White River, R24E T10S Sec. 17, NW 1/4, May 24, 1975 (probable nest); three and one-half miles west of Watson, R24E T11S Sec. 4, June 10, 1975, and an inactive aerie located about 1/8 mile north of there; two adults along Asphalt Wash Road, four miles south of White River, R24E T11S Sec. 6 and an active nest with 2 young and an egg still being incubated, May 20, 1975.

B. From peripheral area: Three birds seen along the White River two miles west of Bitter Creek, R22E T9S Sec. 34 and an active aerie observed; two birds along the White River, R22E T9S Sec. 28, May 25, 1975; one along the White River, R22E T9S Sec. 21, April 19, 1975; two birds along the White River, R22E T9S Sec. 21; two birds and an active aerie with one young along White River, R22E T9S Sec. 20; White River, R22E T9S Sec. 17, May 25, 1975; Ouray Refuge, R20E T8S Sec. 27, February 16, 1975; Devils Playground, five miles north of Little Bonanza, R24E T8S Sec. 21, May 2, 1975. Strong, during a roadside census, recorded one bird near Rainbow on June 12, 1974 (unpub. data).

C. Data from literature and other sources: Twomey (1942: 377) reported a specimen taken 9 miles east of Vernal on May 25, 1937, and one from two miles south of Jensen on September 27, 1937. His sight records for June and July from the general oil shale area in Utah were obtained at four miles south of Jensen and along Hill Creek, 40 miles south of Ouray. Additional records for the general Uinta Basin-Uinta Mountain region were from the Yampa River, eight miles north of Elk Springs, Colorado; Blue Mountain, 25 miles east of Vernal. Ashley Canyon, north of Vernal; Green Lake, 8000 feet, Uinta Mountains; Paradise Park, 10,050 feet, Uinta Mountains; Uinta Canyon, 20 miles north of Roosevelt; Moon Lake, 9,500 feet, 40 miles north of Duchesne; Indian Canyon, 20 miles southeast Duchesne. He also noted that the telephone poles between Vernal and Jensen were favorite perches of Red-tails. He found light-phased hawks to be the most numerous with melanistic individuals seen occasionally.

Hayward (1967: 22) from some 40 sightings says that Red-tails are commonly found in the Colorado River basin from lowlands to montane forests and woodlands. He considered this species to be by far the most common soaring hawk of the Upper Colorado River basin. Olsen (1973: 92) lists the Red-tail as a common resident throughout the entire oil shale area. The Ouray refuge notes

B. From peripheral areas: Three birds seen along the White River two miles west of Bitter Creek, R25E T9S Sec. 34 with an active nest nearby; two birds along the White River, R22E T9S Sec. 28, May 25, 1975; one along the White River, R22E T9S Sec. 21, April 13, 1975; two birds along the White River, R22E T9S Sec. 21; two birds and an active nest with one young along White River, R22E T9S Sec. 20; White River, R22E T9S Sec. 17, May 27, 1975; Ouray Refuge, R20E T8S Sec. 27, February 16, 1975; [illegible] Campground, five miles north of Little Bonanza, R24E T10S Sec. 21, May 8, 1975. Although not on a field-side census, recorded one bird near Bonanza on June 17, 1975 (Weeks, [illegible]).

C. Data from literature and other sources: Twomey (1942: 377) reported a specimen taken 8 miles east of Vernal on May 19, 1937, and one from two miles south of Jensen on September 20, 1937. His other records for June and July from the general oil shale area in Utah were obtained at four miles south of Jensen and along Hill Creek, 40 miles south of Ouray. Additional records for the general Uinta Basin-Uinta Mountain region were from the Yampa River, eight miles north of Elk Springs, Colorado; Blue Mountain; 15 miles east of Vernal; Ashley Canyon, north of Vernal; Green Lake, 8000 feet, Uinta Mountains; Paradise Park, 10,000 feet, Uinta Mountains; Vista Canyon, 10 miles north of Whiterocks; Moon Lake, 8,500 feet, 40 miles north of Duchesne; Indian Canyon, 20 miles southeast Duchesne. He also noted that the telephone poles between Vernal and Jensen were favorite perches of Red-tails; he found light-phased birds to be the most numerous with melanistic individuals seen occasionally.

Hayward (1967: 22) from some 40 sight-records found that Red-tails are commonly found in the Colorado River basin from lowlands to montane forests and woodlands. He considered this species to be by far the most common soaring hawk of the Upper Colorado River Basin. Olson (1973: 30) lists the Red-tail as a common resident throughout the entire oil shale area. The Ouray Refuge notes the Red-tail as common in spring, fall and winter and occasional in summer. During the winter raptor study conducted by the Utah Division of Wildlife Resources one Red-tail was observed in the northeast region.

In the University of Utah collection there are six specimens from the oil shales area and East Tavaputs Plateau as follows: 20 miles south Ouray, July 15, 1966; 1 mile north Pine Spring and 40 miles southeast Ouray, July 8, 1966; Junction South Canyon with Sweetwater Canyon, 46 miles southeast Ouray, July 13, 1966; Mormon Ridge, 3 miles northeast Weaver Reservoir, and 57 miles south Ouray, July 25, 1966, and Weaver Reservoir, 60 miles south Ouray, July 23, 1966, and July 28, 1966.

The files of the University of Utah indicate that the species was seen in the general oil shale area as follows: One mile south Fort Duchesne, June 19, 1966; Pelican Lake, May 27, 1966; Ouray National Wildlife Refuge, August 2, 1966; between Ouray and South Canyon, July 15, 1966; between Towave and Weaver reservoirs on Mason Ridge, July 23 and 29, 1966; Weaver Reservoir, July 26, 1966, and July 19, 1967; 5 miles north Weaver Reservoir, July 23, 1967; Monument Ridge, July 8, 1966; Mormon Ridge, July 25, 1966; Pine Spring, June 30, 1967, and July 9, 1967; Flat Rock mesa, July 25, 1967; P. R. Spring, July 6, 1967; South Canyon, July 1-2, 1967; junction South and Sweetwater canyons, July 12, 1967.

Trends - Doubtless formerly abundant and still is, so no trends evident.

Ecology -

A. Habitat preference: The numerous observations demonstrate that the species occurs in virtually all ecological situations from the valley floors, the desert shrub, pygmy forest and high into the mountains where the coniferous forest occurs. They apparently forage widely. For nesting, they utilize cottonwoods along the White River, ledges on cliffs, bushy junipers on benchlands and coniferous trees in the mountains. Hayward (loc. cit.) comments

that whereas mountain-dwelling individuals often use tall trees as nesting sites, in the lowlands the nests are more often built high up in ledges where they are inaccessible. He mentions a well-known trait that in open-desert country this hawk is frequently seen perched on utility poles along highways where it becomes an easy target for the gunner.

B. Mating activity: Mating was observed along the White River at Bitter Creek on May 25, 1975. The male rose above the air currents and positioned himself above the female, then quickly dove towards her. The female instantaneously rolled over and thrust her claws forward as if to ward off his attack. The male swerved to one side, then once again climbed to his previous position and repeated the ritual.

C. Number of nest site locations: In the course of our field work we discovered six nests which were located as follows:

1. White River, 1/4 mile north of Ignatio, R24E T10S Sec. 1 (2 young) May 25, 1975
2 - White River R24E T10S Sec. 17 (2 eggs) May 27, 1975
3 - White River R22E T9S Sec. 34 (2 young) May 25, 1975
4 - White River R22E T9S Sec. 27 (2 young) May 25, 1975
5 - White River R22E T9S Sec. 20 (1 young) May 25, 1975
6 - Asphalt Wash R24E T11S Sec. 6 (2 young, 1 egg) June 7, 1975

Michael Horton obtained one nesting record east of Cowboy Canyon, R25E T9S Sec. 27 in late May 1971. There were two adults at the nest with two young. The nest was located on a high cliff on the north side of the White River. It faced southward. He also discovered a nest with young on a small island in the Green River several miles below the Jensen bridge during the spring of 1967. It has since been abandoned and taken over by an osprey.

D. Food and food relations: May (1935) states that the Red-tailed Hawk shows a wide range of items in its feeding habits with emphasis

on mammalian food and including such items as prairie dogs, cottontails, jackrabbits. One sample of 31 stomachs from the state of Washington showed that 83% of the contents were ground squirrels, 6% rabbits, 4% meadow mice and 7% snakes. Unusual items were birds such as meadowlarks, crows, vesper sparrows and poultry. A much larger sample of 1013 stomachs from all over the country yielded the following results: mammal remains in 857, poultry or game birds in 112, other birds in 84, other vertebrate 118, insects 92, empty stomachs 146. W. L. Finley reported Red-tailed Hawks feeding on carp and catfish when the Columbia River overflowed in 1907. May further notes that often the food of red-tails, as well as other buteonine hawks, consists of mammals or birds picked up dead or crippled. This accounts for a portion of the poultry and game birds found in the stomachs.

Mc Atee (1935) reported on an analysis of 754 stomachs. Remains of domestic fowl occurred in 60. Seventeen or about 2.25% contained game birds, the kinds being wild duck in 4, ruffed grouse in 3, sharp-tailed grouse 1, prairie chicken 1, pheasant 3, bobwhite quail 2 and scaled quail 2. Other birds included sparrows in 15, meadow larks in 7, robins in 6 for a total of a little less than 6%. As regards mammals preyed upon, approximately one half of the total number contained mice. Of these, meadow mice appeared in 228, deer mice in 129, house mice in 28. Squirrels appeared in 80 stomachs and ground squirrels were in 39 of these. Rabbits were in 64, shrews in 63, gophers 13, house rats 13, cottonrats 10, moles 7, bats 2, porcupine 1, and woodchuck 1. Reptiles were represented by snakes in 32, lizards in 8 and remains of a turtle in one. Frogs were in 13, toads in 8, and salamanders in one. Invertebrates included grasshoppers in 61 stomachs (8%), caterpillars and other insects in 41, crayfish in 12, spiders in 3, centipedes in 1.

Bent (1937) commented that it is generally conceded that the Red-tailed Hawk is a highly beneficial species since its food consists mainly of injurious rodents and it does very little damage to domestic poultry or wild birds. He

abstracts the studies of several other investigators such as A. K. Fisher who in 1893 reported on 562 stomachs as follows: poultry in 54, other birds in 51, mice in 278, other mammals in 131, amphibians and reptiles in 37, insects in 47, crayfish in 8, while 89 were empty. Thus 85% contained evidences of harmful rodents. B. H. Warren in 1890 examined 173 stomachs. Mice were in 131, rabbits in 6, red squirrels in 3, skunks 2, small birds 18, poultry 14, insects in 3, snakes in 3, carrion in 4. George M. Sutton made a study in 1928 of 32 red-tail stomachs taken in Pennsylvania. Of these 12 were empty. The other 20 contained field mice, shrews, red-backed mice, chipmunks, red squirrels, gray squirrels, one brown rat, a winter wren, a song sparrow, a hermit thrush, one-half grown leghorn chicken, garter snakes, a grasshopper, a cricket and one large beetle. Bent summaries the kinds of mammals eaten by Red-tailed Hawks as follows: house mouse, various field and wood mice, rats, various squirrels both arboreal and ground, racoon, gopher, prairie dog, woodchuck, rabbits, mole, bats, shrews, chipmunk, muskrat, porcupine, weasels and skunks. His list of birds utilized includes domestic poultry, young turkey, pintail, teals, other wild ducks, gallinules, rails, pheasants. ruffed grouse, various quails, doves, screech owl, kingfisher, woodpeckers, crow, starling, grackles, meadowlark, horned lark, orioles, various sparrows, juncos, thrushes, robins and bluebirds.

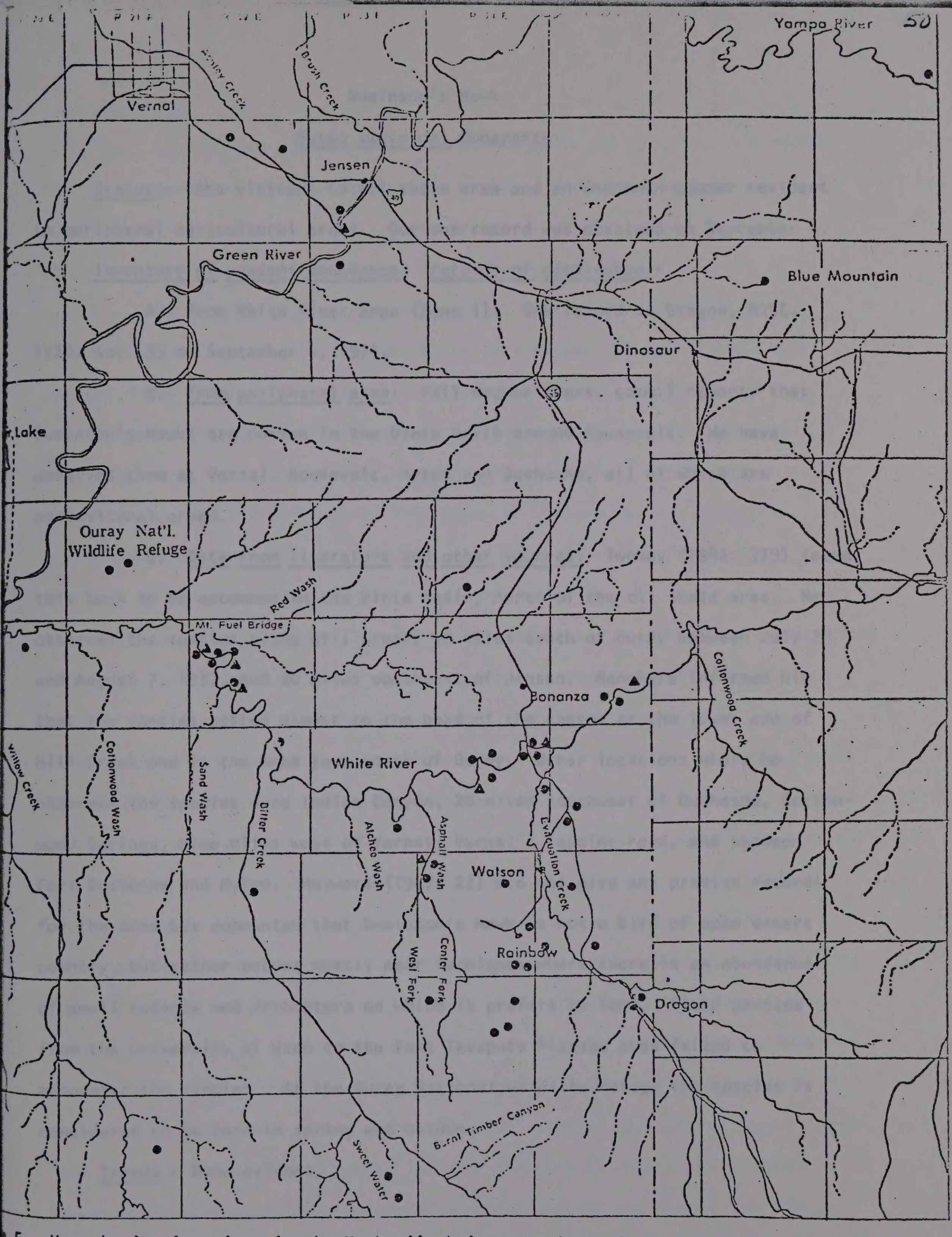
The Craigheads (1956) analyzed a number of oral pellets in a comparative study for the years 1942 and 1948. About 90% of the diet consisted of mammals. The most heavily utilized were meadow mice, 89.0 and 84.0 per cent, next came white-footed mice, 6.7 and 6.3 per cent, and then in small amounts Norway rat, shrews, moles, weasels, rabbits. Their two categories of birds consisted of pheasant and small birds. The latter showed heavier usage in 1948 (5.3 per cent) than in 1942 (0.3 per cent).

In our own limited observations on the feeding habits of red-tails in the oil shale area, either of items at nest sites or observations on actual capture,

the kinds utilized were antelope ground squirrels, jack rabbits and snakes.

E. Feeding sites and foraging areas in terms of habitat preference: None that we could determine. They forage widely around their nest site, utilizing whatever mammals, birds, reptiles and insects that are available.

F. Food availability: High, as inferred from the diversification manifest in feeding habits and the abundance of the many items in the area, particularly in the White River bottomlands.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Sweet Water

5. Map showing locations in the Utah oil shale area where the Red-tailed Hawk has been observed. Round spots indicate locations where the species was seen; triangles indicate nesting sites.

Swainson's Hawk

Buteo swainsoni Bonaparte

Status - Rare visitant to oil shale area and an uncommon summer resident in peripheral agricultural areas. Our one record was obtained on September 4.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1): One record at Dragon, R25E. T12S. Sec. 35 on September 4, 1974.

B. From peripheral area: Phil Wagner (pers. comm.) reports that Swainson's Hawks are common in the Uinta Basin around Roosevelt. We have observed them at Vernal, Roosevelt, Myton and Duchesne, all of which are agricultural areas.

C. Data from literature and other sources: Twomey (1942: 379) found this hawk to be uncommon in the Uinta Basin, north of the oil shale area. He observed the species along Hill Creek, 40 miles south of Ouray between July 28 and August 7, 1937, and 20 miles southeast of Jensen. Ranchers informed him that the species nested almost to the head of the canyon at the lower end of Hill Creek and in the area just south of Ouray. Other locations where he observed the species were Indian Canyon, 20 miles southwest of Duchesne, Cottonwood Springs, nine miles west of Vernal; Vernal - Lapoint road, and between Fort Duchesne and Myton. Hayward (1967: 22) did not give any precise records for the area but commented that Swainson's Hawk is not a bird of open desert country, but rather occurs mostly near farmlands where there is an abundance of small rodents and Orthoptera on which it prefers to feed. Field parties from the University of Utah to the East Tavaputs Plateau area failed to encounter the species. At the Ouray National Wildlife Refuge the species is considered to be rare in spring and autumn.

Trends - None evident.

Ecology -

A. Habitat preference: The occurrence of this species is closely associated with farmlands and cultivated fields. Hence, although they are fairly common in the Uinta Basin, they are rare in the oil shale area and occur there only as a rare visitant, mostly during migration.

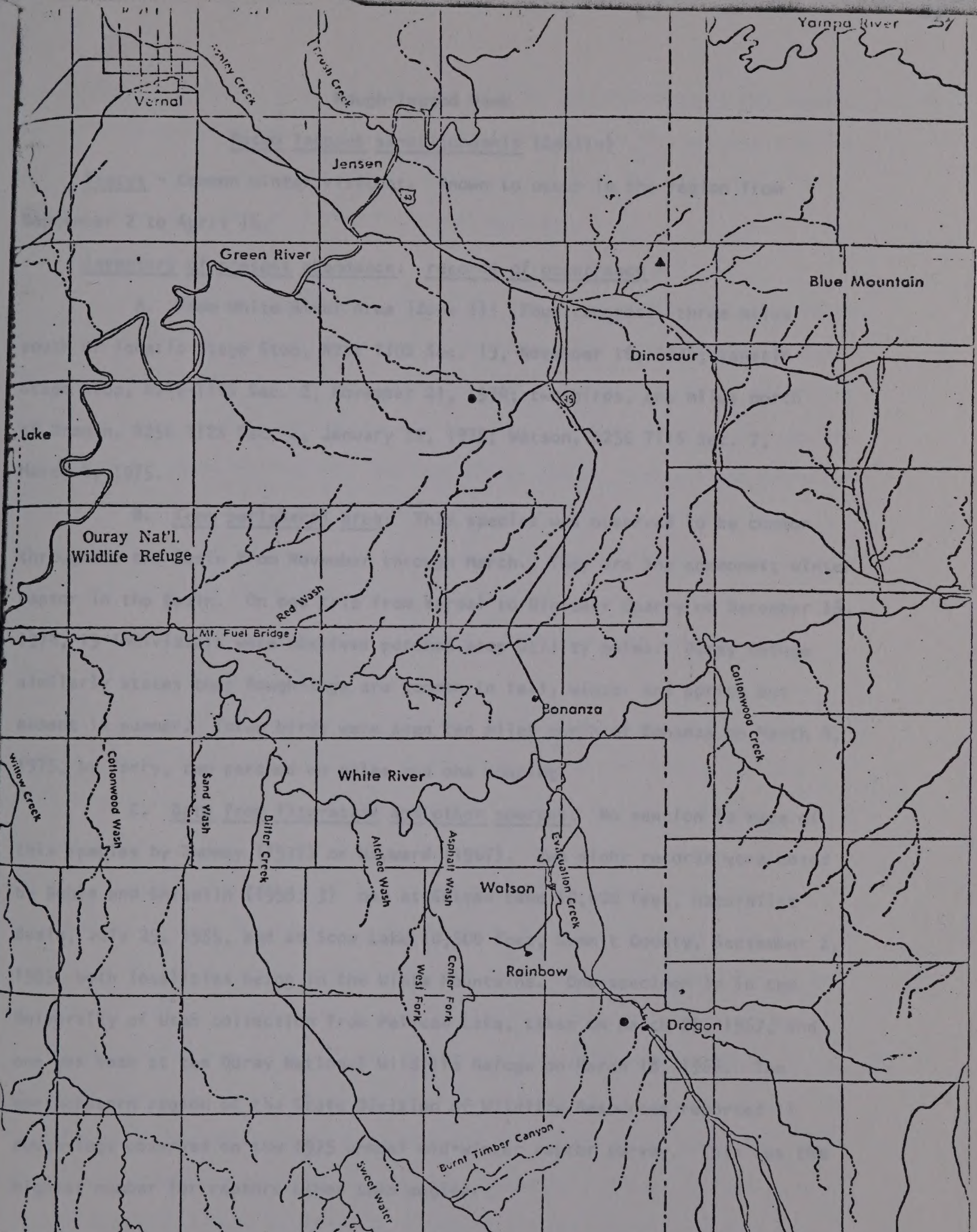
B. Number of nest site locations: None in the oil shale area. However, Michael Horton found two nests in 1971 (dates not specified). One was on the periphery of the oil shale area one mile west of Pelican Lake. It was located in a short tree and contained two young. The second nest was farther away at Blue Mountain on the Utah-Colorado border, 8,750 feet in a grove of aspens. He was aware of this being an unusual nesting situation but he observed the nest and bird for a considerable length of time at a distance of a few feet and was certain of the identity.

C. Food and food relations: May (1935) states that this hawk destroys great quantities of field mice, gophers and ground squirrels as well as grasshoppers and other injurious creatures. Consequently it is one of our most useful hawks. He cites numerous authors whose observations offer corroboration. One study was of an analysis of 45 stomachs from Washinton state which showed that 90 per cent of the remains were ground squirrels and 10 per cent snakes and grasshoppers and other insects. Mc Atee (1935) states that it is evident that this species is by no means a bird hawk since only one grouse and nine small birds appeared in 111 stomachs. Ground squirrels were the principal food item, appearing in 62 or well over half of the stomach contents. Other items were pocket gophers in 5, meadow mice in 6, other mice in 2, rabbits in 3, kangaroo rat in one and shrew in one, snakes in 9, lizards 5, toads 5, grasshoppers in 24, Mormon cricket in 8, caterpillars 8, other insects 17, spiders 3, centipede one. The maximum number of rodent remains represented in a single stomach consisted of ground squirrel 4, meadow mouse 5, pocket gophers 6. As many as

200 grasshoppers were found in a single stomach. Bent (1937) comments that the food habits of the Swainson's Hawk are highly beneficial and it is one of the farmer's best friends for it feeds almost entirely on injurious rodents and insects with a minimum of birds and poultry. He cites a study of A. K. Fisher in 1893 who examined 18 stomachs. Seven contained small mammals, rabbits, gophers, ground squirrels and mice, while 8 contained insects, 3 lizards and 3 frogs. None contained traces of birds or poultry. One stomach contained 68 locusts and another 50 grasshoppers.

D. Feeding sites and foraging areas in terms of habitat preference: The species is virtually nonexistent in the oil shale area, so no data on this.

E. Food availability: In abundant supply in the peripheral agricultural areas where the species occur commonly.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e 6. Map showing locations in the Utah oil shale area where the Swainson's Hawk has been observed. Round spots indicate locations where the species was seen; triangle indicates a nesting site.

Rough-legged Hawk

Buteo lagopus sanctijohannis (Gmelin)

Status - Common winter visitant. Known to occur in the region from September 2 to April 16.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Four records: three miles south of Ignatio Stage Stop, R24E T10S Sec. 13, November 16, 1974; Ignatio Stage Stop, R24E T10S Sec. 2, November 21, 1974; two birds, one miles north of Dragon, R25E T12S Sec. 2, January 22, 1975; Watson, R25E T11S Sec. 7, March 4, 1975.

B. From peripheral area: This species was observed to be common throughout the Basin from November through March. They are the commonest winter raptor in the Basin. On one trip from Vernal to Dinosaur Quarry on December 16, 1974, 13 individuals were observed perched atop utility poles. Ouray Refuge similarly states that Rough-legs are common in fall, winter and spring but absent in summer. Three birds were seen ten miles north of Bonanza on March 4, 1975, by Perry, two perched on poles and one soaring.

C. Data from literature and other sources: No mention is made of this species by Twomey (1937) or Hayward (1967). Two sight records were noted by Behle and Ghiselin (1958: 3) one at Gatman Lake 10,400 feet, Naturalist Basin, July 29, 1955, and at Scow Lake 10,500 feet, Summit County, September 2, 1955, both localities being in the Uinta Mountains. One specimen is in the University of Utah collection from Pelican Lake, taken on March 20, 1967, and one was seen at the Ouray National Wildlife Refuge on March 18, 1966. The northeastern region of the State Division of Wildlife Resources reported 11 rough-legs observed on the 1975 annual mid-winter raptor survey. This was the highest number for raptors other than eagles.

Trends - Probably none. The lack of data in the literature on the occurrence of the Rough-leg Hawk in the region as compared with the commonness of the species in present times might suggest a changing status, but more likely it simply indicates a lack of winter field work earlier.

Ecology -

A. Habitat preference: Rough-legs are common winter visitants in the oil shale region, concentrating primarily near open water along the White River. They also hunt on the bench areas. They frequent the desert areas of the entire state and appear to fill the habitat and foraging areas evacuated by the exodus through migration of the Red-tail and Ferruginous Hawks. They prey upon similar species as well (i.e. jackrabbits, small rodents, road-kills, and carrion). In eastern Utah they are commonest in the Upper Basin frequenting areas near highway, roads, and farmlands where good physical perches are found.

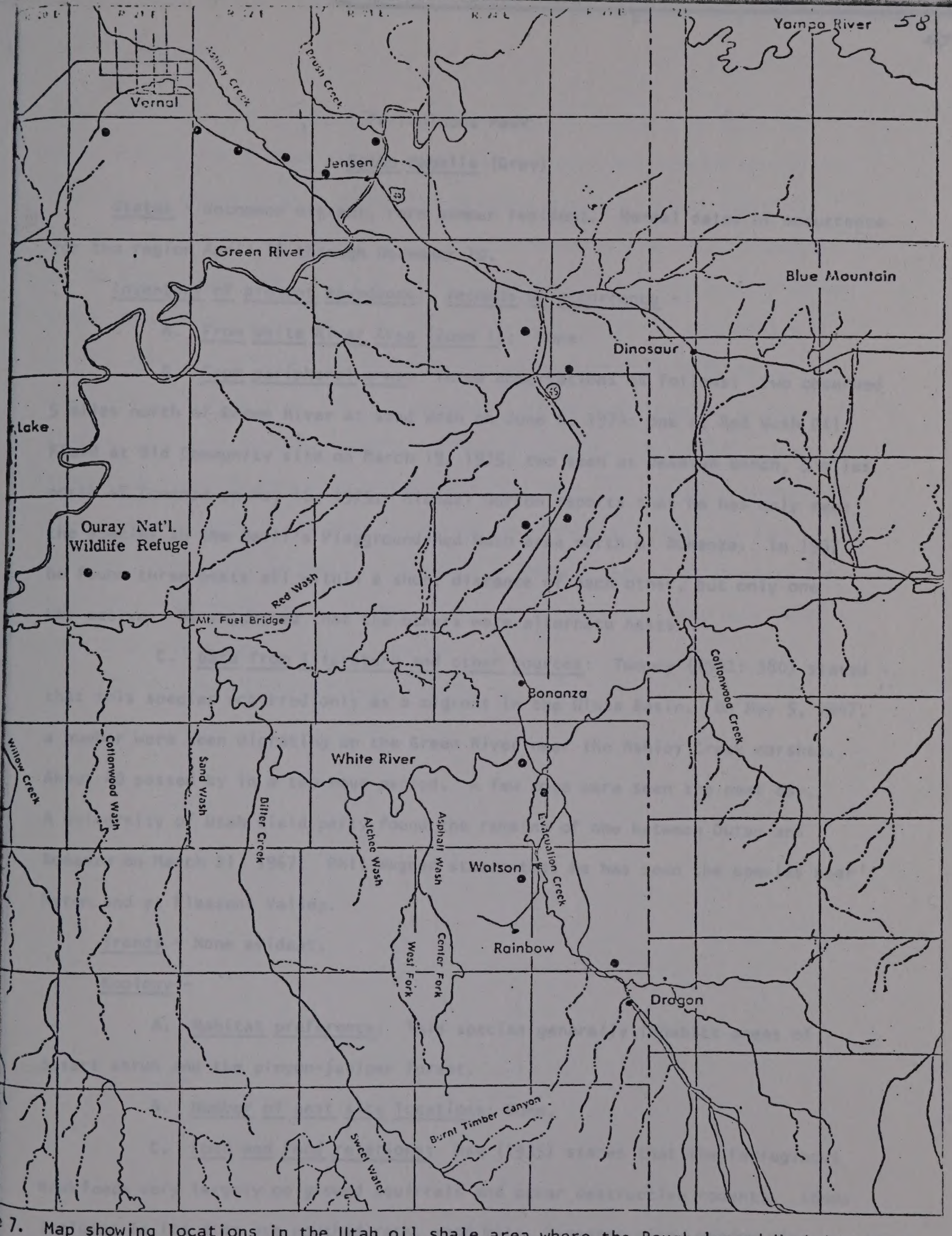
B. Number of nest site locations: None since the species is a winter visitant to the oil shale area.

C. Food and food relations: May (1935) states that this species ranks high as a beneficial hawk. The bulk of its food consists of meadow mice and similar destructive rodents. He cites several articles giving items eaten including moles, frogs, crippled ducks, prairie dogs, gophers, shrews. He gives one summary of a sample of 221 stomachs examined. Mammals occurred in 202, poultry or game in only one, other birds in 9, other vertebrates in 8, insects in 19, while 21 were empty. Mc Atee (1935) reported on the contents of 99 stomachs. Of birds eaten there was a pied-billed grebe, a ruddy duck and 2 smaller birds of unspecified kind. Meadow and Pine mice were heavily utilized, appearing in 51 stomachs. Other items were: house mice in 5, lemmings in 22 (largest number in one stomach, 4), desert mouse 15, three brown rats in one stomach, rabbits in 9, ground squirrels in 5, pocket gophers in 3, prairie dog in 1, weasel 1, shrews 2, traces of lizards, toads and a fish in

a single stomach, grasshopper 1, caterpillar 2, crayfish 1. Bent (1937) states that while records of rodent food of this hawk abound in the literature, reports of the use of birds are rare. He comments that dead birds, dead mammals and fish and even carrion are eaten. The Craigheads (1956) report only 4 passerine birds eaten. The mammals in order of abundance found in pellets were meadow mouse 170, White-footed mouse 6, Norway rat 2, short-tailed shrew 10, other shrews 11.

D. Feeding sites and foraging areas in terms of habitat preference: No special areas: they forage widely. Since they are prone to perching and for this use poles along highways, probably a higher degree of foraging occurs in the vicinity of roadways than elsewhere.

E. Food availability: High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7. Map showing locations in the Utah oil shale area where the Rough-legged Hawk has been observed

Ferruginous Hawk

Buteo regalis (Gray)

Status - Uncommon migrant, rare summer resident. Normal dates of occurrence for the region April 15 through November 10.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): None

B. From peripheral area: Three observations as follows: two observed 5 miles north of Green River at Sand Wash on June 6, 1974; one at Red Wash Oil Field at Old Community site on March 19, 1975; two seen at Deadman Bench, 5 miles north of Bonanza on May 16, 1975. Michael Horton reports that he has only seen the species in the Devil's Playground-Red Wash area north of Bonanza. In 1967 he found three nests all within a short distance of each other, but only one was active. He suggested that the others were alternate nests.

C. Data from literature and other sources: Twomey (1942: 380) stated that this species occurred only as a migrant in the Uinta Basin. On May 5, 1947, a number were seen migrating up the Green River near the Ashley Creek marshes. About 40 passed by in a two-hour period. A few more were seen the next day. A University of Utah field party found the remains of one between Ouray and Bonanza on March 21, 1967. Phil Wagner states that he has seen the species near Myton and at Pleasant Valley.

Trends - None evident.

Ecology -

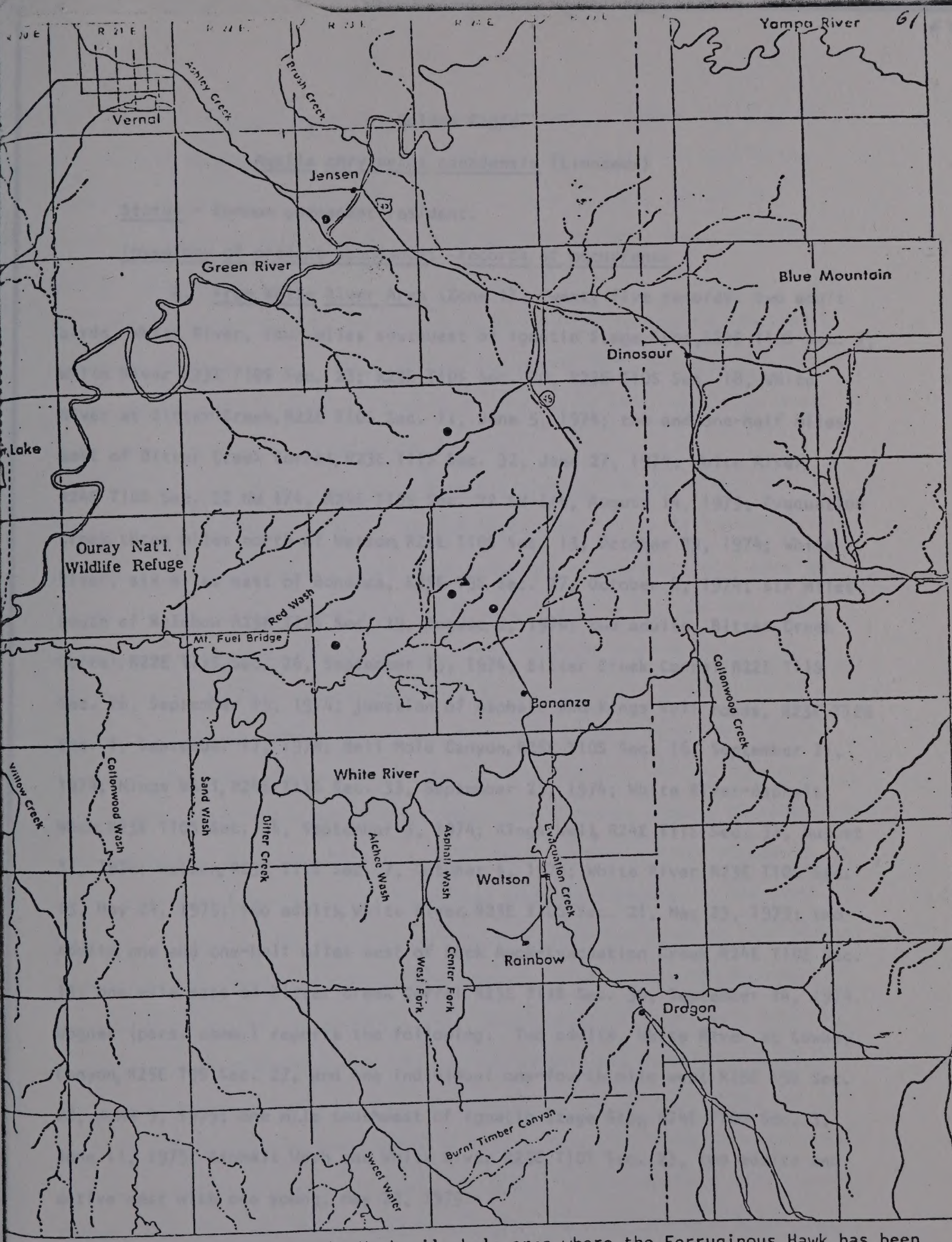
A. Habitat preference: This species generally inhabits areas of desert shrub and the pinyon-juniper forest.

B. Number of nest site locations: None.

C. Food and food relations: May (1935) states that the Ferruginous Hawk feeds very largely on ground squirrels and other destructive rodents. Items included in its diet are pouched rats, wood mice, kangaroo mice, meadow mice,

ground squirrels, prairie dogs, rabbits, bull snakes, pocket gophers, a few birds such as sharp-tailed grouse, magpie, meadowlarks, and insects such as grasshoppers and crickets. Twenty-four stomachs analyzed yielded mammals in 21, poultry or game in 1, other birds in 1, other vertebrates in 2, insects in 2. Mc Atee (1935) found only 2 birds in 17 stomachs. They were a sharp-tailed grouse and a savannah sparrow. He found rabbits to constitute the chief food of this hawk, being found in 8 stomachs, then ground squirrels in 4, meadow mice in 3, and other mice in 1. In two instances 5 meadow mice appeared in one stomach. He found only one insect, a Jerusalem cricket. Bent (1937) commented that the Ferruginous Hawk is a highly beneficial hawk that should be encouraged as a great destroyer of rodents. He states that nearly all observers agree that their food consists almost exclusively of mammals that range in size from jack rabbits to meadow mice. Snakes, lizards and skunks are taken upon occasion along with grasshoppers, crickets and beetles.

E. Food availability: Moderate.


R 21 E
Yampa River
Ashley Creek
Brush Creek
Vernal
Jensen
Green River
Blue Mountain
Dinosaur
Lake
Ouray Nat'l. Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Cottonwood Creek
Bonanza
White River
Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Alchee Wash
Asphalt Wash
Evacuation Creek
Watson
Rainbow
West Fork
Center Fork
Dragon
Burnt Timber Canyon
Sweet Water

e 8. Map showing locations in the Utah oil shale area where the Ferruginous Hawk has been observed. Round spots indicate locations where the species was seen; triangle indicates a nesting site.

Golden Eagle

Aquila chrysaetos canadensis (Linnaeus)

Status - Common permanent resident.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Twenty-five records: two adult birds, White River, four miles southwest of Ignatio Stage Stop, R24E T10S Sec. 7; White River R23E T10S Sec. 23; R23E T10S Sec. 20, R23E T10S Sec. 18, White River at Bitter Creek, R22E T10S Sec. 11, June 5, 1974; two and one-half miles east of Bitter Creek Corral, R23E T11S Sec. 32, June 27, 1974; White River, R24E T10S Sec. 22 NW 1/4, R24E T10S Sec. 22 SW 1/4, August 14, 1975; Evacuation Creek, three miles north of Watson, R24E T10S Sec. 13, October 29, 1974; White River, six miles east of Bonanza, R25E T9S Sec. 27, October 8, 1974; six miles south of Rainbow R25E T12S Sec. 19, August 8, 1974; two adults, Bitter Creek Corral, R22E T11S Sec. 26, September 13, 1974; Bitter Creek Corral, R22E T11S Sec. 26, September 15, 1974; junction of Asphalt and Kings Well roads, R23E T12S Sec. 1, September 17, 1974; Hell Hole Canyon, R25E T10S Sec. 16, September 21, 1974; Kings Well, R24E T11S Sec. 33, September 23, 1974; White River-Asphalt Wash, R23E T10S Sec. 24, September 5, 1974; Kings Well, R24E T11S Sec. 33, August 31, 1974; Watson, R25E T11S Sec. 7, October 5, 1974; White River R23E T10S Sec. 13, May 24, 1975; two adults, White River, R23E T10S Sec. 21, May 23, 1975; two adults, one and one-half miles west of Duck Rock-Evacuation Creek, R24E T10S Sec. 13; one mile east of Bitter Creek Corral, R23E T11S Sec. 30, September 14, 1974. Wagner (pers. comm.) reports the following: Two adults, White River at Cowboy Canyon, R25E T9S Sec. 27, and one individual one-fourth mile west R25E T9S Sec. 28, June 9, 1975; one mile southwest of Ignatio Stage Stop, R24E T10S Sec. 3, June 11, 1975; Asphalt Wash and White River R23E T10S Sec. 23, two adults and active nest with one young, May 23, 1975.

B. From peripheral area: Seep ridge road September 21, 1974; one mile south of Mountain Fuel Bridge, R22 T9S Sec. 20; one and one-half miles north of Mountain Fuel Bridge, R22E T9S Sec. 9, June 5, 1974; two adults, eight miles north of Bonanza, R24E T8S Sec. 18, May 25, 1975; Ouray, R20E T8S Sec. 32, January 13, 1975.

Michael Horton reports the species to be numerous throughout the region. In 1971 he found an active nest near the road to Red Wash, southeast of Jensen. It was located about 5 miles south of U. S. Highway 40 on a ledge of a steep cliff facing northwest. It contained two young.

C. Data from literature and other sources: Twomey (1942: 380) located two active nests north of the oil shale area, one on Blue Mountain on June 26, 1937, the other one-fourth mile northwest of Dripping Rock Creek on May 25. He observed the species at Green Lake, Paradise Park and Moon Lake in the Uinta Mountains, at Cottonwood Springs, 9 miles west of Vernal, in Ashley Canyon, at 20 miles southwest of Duchesne, at Beaver Creek, 7 miles northwest of Lodore, Moffat County Colorado. His sight records in or close to the oil shales area were from the Ashley Creek marshes, 2 miles south of Jensen; Hill Creek, 40 miles south of Ouray, and Florence Canyon, 75 miles south of Ouray. Behle and Ghiselin (1958) reported one specimen picked up north of Tridell September 6, 1947, and had numerous sightings in the Uinta Mountains. Hayward (1967:23) gave no precise records but observed that Golden Eagles are most often seen souring over probable nesting sites or feeding on carrion on the ground, often road kills. Occasionally they are seen perching on utility poles along highways. Sight records obtained by University of Utah field parties are as follows: Pelican Lake, May 27 and July 22, 1966, and March 20, 1967; Ouray National Wildlife Refuge, March 21, 1966; between House Rock Ranch and Weaver Reservoir, July 30, 1966; two near mouth of Horse Corn Canyon, July 23, 1966; two in East Canyon, July 11, 1967; junction South and Sweetwater canyons, July 13, 1966.

Ouray refuge lists the Golden Eagle as common in spring and winter, occasional in fall and absent in summer.

In 1972 the Utah Division of Wildlife Resources commenced a project of making annual winter censuses of eagles in the state. In 1973 all raptors were included. In the northeastern region, two routes are partially in the oil shale area. The routes are detailed by Olsen (1973: 112) accompanied by a discussion of the results up to the time of his report. The data pertain to the entire lengths of the routes and hence are of limited value as regards the oil shale area, but nevertheless they give some idea of relative abundance and distribution. The data (updated to 1975) are as follows. The first figure following the year gives the number of Golden Eagles seen while the second figure in parentheses represents the miles travelled per bird seen: January 1972 - 11 (12.5); December 1972 - 8 (29.2); January 1973 - 6 (24.5); February 1973 - 3 (48.3); March 1973 - 8 (16.9); January 1974 - 6 (23.5); January 1975 - 7 (20.4). For comparisons with the Bald Eagle see the account under that species. The Golden Eagle is the more abundant species in the region. For two late summer surveys, applicable to only the Golden Eagles, the results were identical: August 1972 - 5 (27.6) and August 1973 - 5 (27.6).

Trends - No long-range trends evident. The species is common in the oil shale area. However, there may be short-term trends underway. Mike Horton notes a scarcity of rabbits this past year (1974-75) and feels that Golden Eagles are not as common as formerly. He postulates a correlation between the

two, namely a predator-prey relationship. He found that eagle nests built built early in the season in 1975 and showing green vegetation were later found to have been abandoned. He attributed this to lack of food. Of course, there may have been other explanations such as disturbance. However, his observations and inference will bear checking out in future follow-up studies. In our own studies we found that 70% of the suspected aerie sites observed were not being utilized.

Ecology -

A. Habitat preference: Golden Eagles are widespread in their distribution throughout the region in their foraging habits. We frequently saw them foraging over the benchlands both north and south of the White River. As regards nesting, the predominant sites chosen were located on precipitous cliffs and ledges bordering the White River.

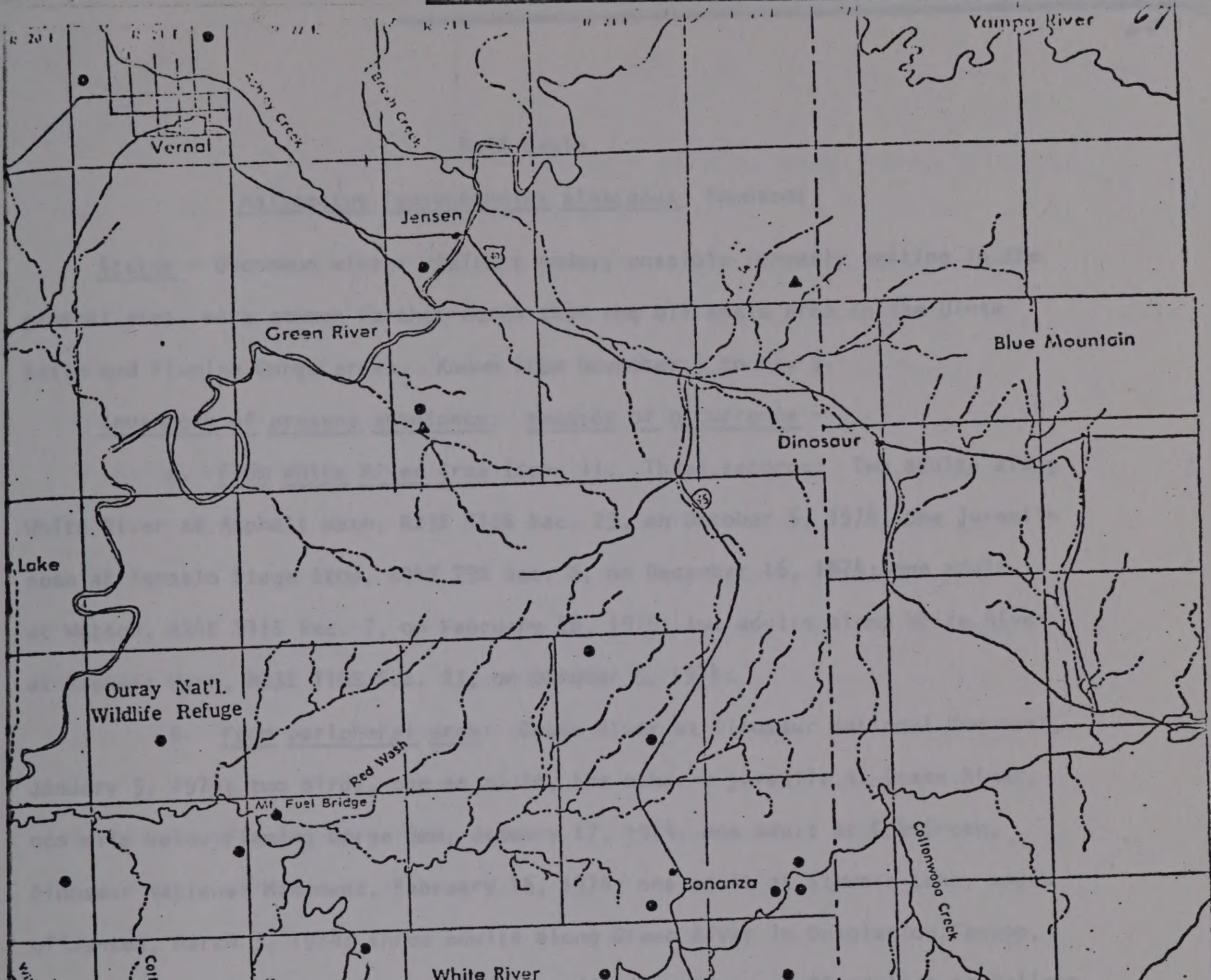
B. Number of nest site locations: One active site located high on a cliff along the White River at R23E T10S Sec. 23. The nest was located on May 23, 1975, and contained one young.

C. Food and food relations: May (1935) notes that whereas the Golden Eagle is generally beneficial in its food habits when such items as rabbits, prairie dogs and gophers are abundant, still it is one of the few species of diurnal birds of prey which can be properly accused of destruction of game birds and mammals. This judgment was made before the modern appreciation of the esthetic value of the species and at a time when raptors were classified as "good" or "bad" in terms of their relation to poultry and game. Items listed by May as being eaten by Golden Eagles are: young fawns of antelope and deer, marmots, prairie dogs, hares, cottontails, woodrats, squirrels, wild turkeys, waterfowl from geese to smaller ducks, grouse, meadowlarks, snakes. He gives the results of analysis of 80 stomachs as follows: mammals in 60, poultry or game in 7, other birds in 7, other vertebrates 1, insects 1 and 5 empty.

According to Mc Atee's (1935) study rabbits were the leading article of food occurring in 14 out of 26 stomachs examined. Carrion was found in 3, gray squirrels 2, woodchucks 2, pintail 2, ground squirrel 1, chicken 1, varied thrush 1. Bent's (1937) list of mammal items eaten include deer and their fawns, antelope, lambs of mountain sheep, domestic sheep, goats, calves, dogs, cats, young pigs, foxes, hares, rabbits, ground and arboreal squirrels, racoons, prairie dogs, woodchucks, marmots, porcupines, skunks, weasels, marten, pocket gophers, rats, mice and moles. Whereas mammals are taken all seasons, birds are taken primarily during the eagle's nesting season to serve as food for young and include blue herons, geese, ducks, goshawk, red-tailed hawk, turkeys, sage hen and other grouse, ptarmigan, quail, short-eared owl, band-tailed pigeon, crow, domestic poultry, curlew, plover, meadowlark, kingfisher. He gives the following results for 30 stomachs analyzed: cottontails in 11 and jackrabbits in 7, so rabbits were the preferred items, prairie dog in 9, woodchuck in 1, ground squirrel 1, fox squirrel 1, opossum 1, short-eared owl 1, red-tailed hawk 1.

D. Feeding sites and foraging areas in terms of habitat preference: With their nesting sites being located on cliffs along the White River, their foraging areas are the benchlands south of the river and the open low country to the north and west around Ouray.

E. Food availability: Probably moderate as an overall value judgment but fluctuating from year to year. In 1974-75 there seemed to be a scarcity of lagomorphs and rodents, so availability was low during that interval.


Yampa River
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Brush Creek
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Green River
Blue Mountain
Dinosaur
Lake
Ouray Nat'l. Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Bonanza
Cottonwood Creek
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Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Atchee Wash
Asphalt Wash
Watson
Evacuation Creek
Rainbow
West Fork
Center Fork
Dragon
Burnt Timber Canyon
Sweet Water

9. Map showing locations in the Utah oil shale area where the Golden Eagle has been observed. Round spots indicate locations where the species was seen; triangles indicate nesting sites.

Bald Eagle

Haliaeetus leucocephalus alascanus Townsend

Status - Uncommon winter visitant today; possibly formerly nesting in the general area, more common farther north than the oil shale area in the Uinta Basin and Flaming Gorge areas. Known from November 5 to May 5.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Three records: Two adults along White River at Asphalt Wash, R23E T10S Sec. 23, on October 5, 1974; one juvenile seen at Ignatio Stage Stop, R24E T9S Sec. 2, on December 16, 1974; one adult at Watson, R24E T11S Sec. 7, on February 26, 1975; two adults along White River at Asphalt Wash, R23E T10S Sec. 23, on October 5, 1974.

B. From peripheral area: Green River at Dinosaur National Monument, January 5, 1974; two birds, one an adult, the other a juvenile at Green River, one mile below Flaming Gorge Dam, January 17, 1974; one adult at Cub Creek, Dinosaur National Monument, February 16, 1974; one adult at Stewart Lake, south of Jensen, March 3, 1974; three adults along Green River in Desolation Canyon, October 31, 1974; thirty-four individuals (14 juveniles and 20 adults) at Pelican Lake, December 14-17, 1974; two adults at junction of Lake Fork and Yellowstone River, north of Duchesne, March 6, 1975; one juvenile at Moon Lake, 40 miles north of Duchesne, March, 1975.

Phil Wagner (pers. comm.) reports that he has seen numerous individuals in fall and winter roosting at Pelican Lake, along the Duchesne River, Flaming Gorge and Green River in Lodore Canyon. Michael Horton also reports seeing numerous birds in winter at Flaming Gorge, Dinosaur National Monument, Steinaker Reservoir, Green River at Jensen, nearby Stewart Lake, Ouray National Wildlife Refuge, Pelican Lake, Duchesne River area. He considers the species to be common in the Uintah Basin in winter. At the Ouray National Wildlife Refuge the Bald Eagle is reported as common in winter and spring, occasional in fall and absent in the summer.

The State Division of Wildlife Resources makes an annual census of Eagles. Their route does not include the oil shales area.

The possibility exists that the southern race of Bald Eagle, which is the endangered kind, still breeds in the area, for Mike Horton observed two adults in late June 1971 along the Green River about 6 miles northeast of Ouray. That same year he saw a single adult in early July sitting in a dead tree southwest of Pelican Lake. When we expressed surprise at the time of year of his observations he stated that they were positive identifications and that he thought at the time that a pair must be nesting somewhere in the region.

C. Data from literature and other sources: No mention was made of the species by Twomey (1924). Hayward (1967: 23) gave no records for either the oil shale area or Uinta Basin but stated that he had an unconfirmed but rather reliable report that the species once nested farther west near the confluence of Red Creek and Strawberry River, Duchesne County. University of Utah field parties obtained sight records as follows: Pelican Lake, March 20 and 22, 1967; Ouray National Wildlife Refuge: one on March 19, 1966, 9 on March 21, 1966, and one on March 21, 1966, resting on ice covering a small pond; one near Ouray on March 21, 1967. The one at Pelican Lake on March 22, 1967, had apparently eaten an abundance of dead fish and could not take off in flight.

As pointed out by Olsen (1973: 111-117) in connection with the annual winter eagle census conducted by the Utah Division of Wildlife Resources, two routes in the northeastern region of the state are partially in the oil shale area. Although this activity has only been underway since 1972, some quantitative data are accumulating. The data for the Bald Eagle for the two routes that enter the oil shale area throughout their entire length are as follows. The first figure following the year gives the number of birds seen while the second represents the miles travelled per bird: January 1972 - 2 (69.0); December 1972 - 5 (18.2); January 1973 - 0 (0); February 1973 - 0 (0); March

1973 - 3 (45.0); January 1974 - 0 (0); January 1975 - 2 (71.5). Olsen (op. cit.: 115) states that for the five surveys during the winter months conducted up to the time of his report there was on a statewide basis an average of 28.0 miles driven for each Bald Eagle observation as compared with one sighting in 17.2 miles for the Golden Eagle. The ratio of the number of Bald to Golden eagle sightings for the state averaged 1: 1.6 for all winter surveys. For the northeastern region Golden Eagles outnumbered Bald Eagles during the winter surveys by a ratio of 3.5: 1. On the basis of data for all routes in the northeastern region, Bald Eagles were observed with less frequency than the average for the state (averaging 1 sighting per 50.5 miles as compared with 1 per 28.0 miles. While these data are not very meaningful to date, in time they will be useful in establishing trends as well as relative abundance, density indexes and distribution.

Trends - May once have nested in the general area but probably does not do so today. While still fairly common as a winter visitant in northeastern Utah the numbers are probably reduced from those in pristine times in keeping with the general decline in numbers in the species.

Ecology -

A. Habitat preference: Areas of rivers, lakes, reservoirs, especially the margins, where fish as food is an attraction but they also need dead trees as perching and roosting sites. The species is gregarious in winter, especially at roosting sites. High numbers have been reported at Pelican Lake and Flaming Gorge. They also utilize utility poles along highways for perching as reported by workers at Bonanza. In the oil shale area Bald Eagles generally remain as long as there is open water along the White River.

B. Number of nest site locations: None since the species today is only a winter visitant.

C. Food and food relations: Fish and carrion essentially but occasionally feeding on jackrabbits. Howard Mc Kowen, Park Ranger at Steinaker

Reservoir has observed Bald Eagles feeding on coots in late winter, the coots having become trapped by encircling ice.

May (1935) reports the Bald Eagle feeding largely upon fish and carrion, varying its diet with birds, small mammals and reptiles. They frequently rob the osprey of fish. It has been reported they live on waterfowl, including Canada geese. Mainly, however, their diet includes suckers and chubs. A list of bird species in their diet includes; puffins, gulls, auklets, murres, all species of ducks, longspurs, rosy-finches, savannah sparrows, fox sparrows, and song sparrows. F. H. Herrick in 1924 studied food brought to several nests in Ohio and found the following percentage results: Fish 70% in 1922 and 96% in 1923. A stomach analysis revealed the following: Total examined 80; mammals 9; poultry or game 12; other vertebrates (fish) 35; misc. 15, empty 11.

Mc Atee (1935) says fish remains were predominant, occurring in 29 of 58 stomachs examined. The fish were identified as salmon (probably carrion picked up after spawning) cod, sunfish, perch, suckers, flounders, eels, and sculpins. The very names of these in themselves suggest that most of them were obtained as carrion, for in no other form would an eagle be likely to get such marine fishes as cod, sculpin and flounder. Waterfowl remains that were identified in 6 stomachs included 1 Bonaparte's gull, 1 American goldeneye and 1 surf scoter. Domestic fowl occurred in 1 stomach. Mammals included rabbits 2, prairie dog 1, rat 1, mouse 1. Food considered carrion, besides fish already mentioned, was found in 14 stomachs; in fact the Bald Eagle's propensity for carrion eating is so strong that the question arises, in the case of almost everything found in the stomach of this bird, as to whether it may not have been taken as carrion.

Bent (1937) gives the following analysis of Bald Eagle's food habits. The bulk of the food of adults consists of fish. The same is true for the young. Among the fish fed to the young were carp, pike, catfish, and sheepshead. Chickens (broiler size) were brought to the nest only 12 times during two

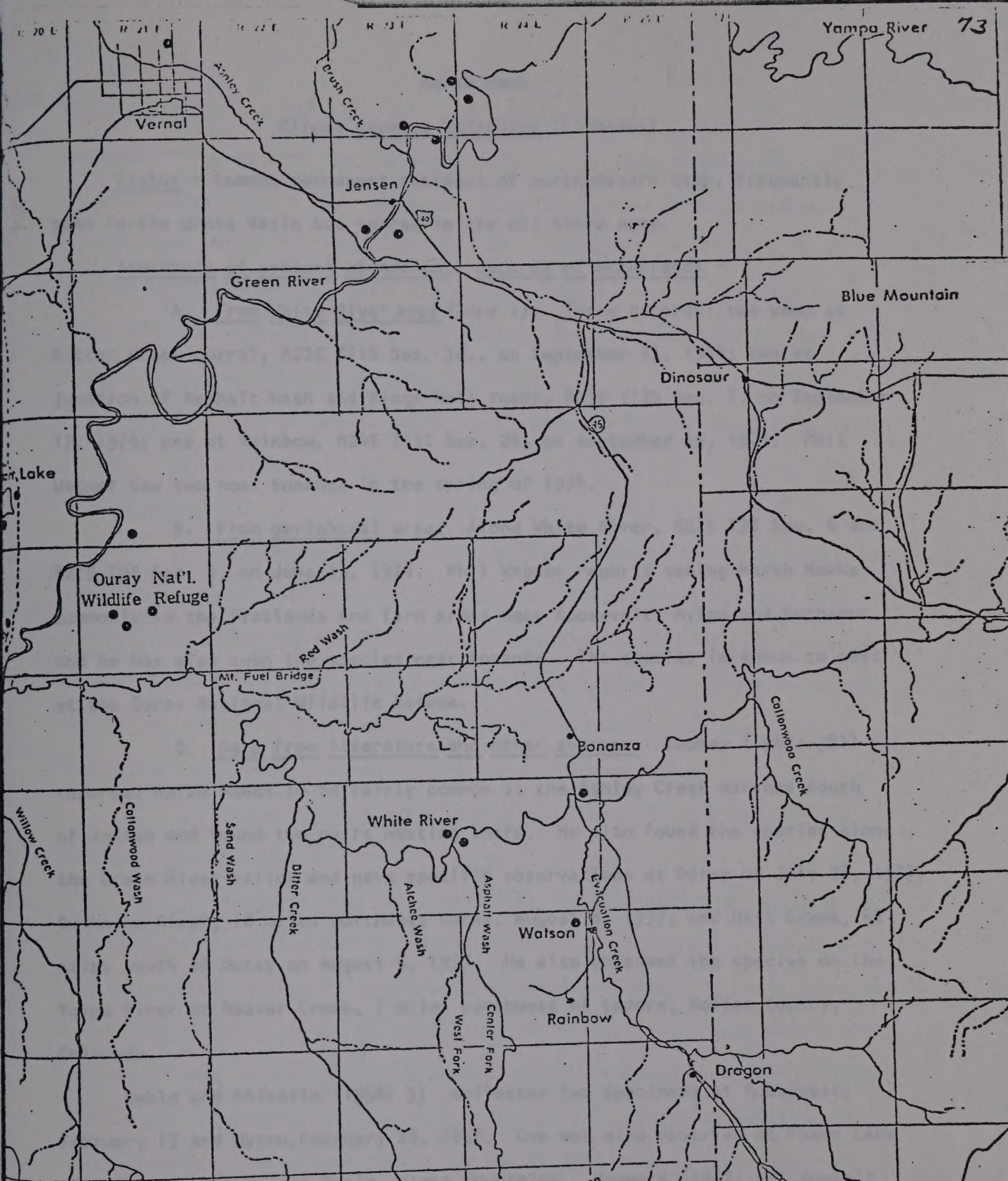
seasons. Other prey included crows, grebes, muskrat, rabbits, squirrels, and rats. Probably most of the fish taken were dead or dying, picked up along the shores or floating on the surface of lakes, ponds or streams. However, eagles are perfectly capable of catching live fish.

A combined U. S. Dept. of Agriculture and U. S. Dept. of the Interior brochure on the Bald Eagle in Alaska points out that confusion has arisen over the Bald Eagle's feeding habits. Fishermen have complained in the past that the eagle feeds on spawning salmon. However, those taken do not compete with the fisherman since most are dead or dying after spawning. Eagles eat as part of their marine diet sea urchins, clams, and crabs. Circular 30, U. S. Fish and Wildlife Service, summarizes the food habits of the Bald Eagle as follows. Fish are their "staff of life." This has been demonstrated in Alaska where fish appeared in 325 or 74.7%. In other places than Alaska, fish are also very important to the Bald Eagle. Of 31 stomachs examined within the lower 48 states, 18 contained fish.

D. Feeding sites and foraging area in terms of habitat preference: In the oil shale area, essentially along the White River. However, there are many more aquatic sites in peripheral areas such as the length of the Green River, Pelican Lake, Stewart Lake, Flaming Gorge Reservoir. Hence the species is more abundant outside the oil shale area.

E. Food availability: Moderate.

F. Added item of interest: Woffinden and Murphy (1975: 68) state that during the winter of 1974-75 a color-marked immature bald eagle was observed in the Uinta Basin that had been marked as a nestling in central Saskatchewan, Canada. This suggests that some, at least, of the Bald Eagles that winter in Utah summer in Saskatchewan, Canada.


R 20 E
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Yampa River
Vernal
Ashley Creek
Brush Creek
Jensen
40
Green River
Blue Mountain
Dinosaur
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Lake
Ouray Nat'l. Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Bonanza
Cottonwood Creek
White River
Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Alchee Wash
Asphalt Wash
Evacuation Creek
Watson
Center Fork
West Fork
Rainbow
Dragon
Burnt Timber Canyon
Sweet Water

e 10. Map showing locations in the Utah oil shale area where the Bald Eagle has been observed

Marsh Hawk

Circus cyaneus hudsonius (Linnaeus)

Status - Common permanent resident of northeastern Utah, frequently seen in the Uinta Basin but sparse in the oil shale area.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1): Three records: two seen at Bitter Creek corral, R22E T11S Sec. 26., on September 13, 1974; two at junction of Asphalt Wash and Kings Well roads, R23E T12S Sec. 1, on September 17, 1974; one at Rainbow, R24E T11S Sec. 24, on September 25, 1974. Phil Wagner saw two near Bonanza in the spring of 1974.

B. From peripheral area: Along White River, R22E T9S Sec. 6 and R21E T9S Sec. 1, on June 15, 1974. Phil Wagner reports seeing Marsh Hawks commonly in the flatlands and farm areas near Roosevelt, Myton and Duchesne and he has also seen the species near Bonanza. The species is known to nest at the Ouray National Wildlife Refuge.

C. Data from literature and other sources: Twomey (1942: 381) reported Marsh Hawks to be fairly common at the Ashley Creek marshes south of Jensen and found two pairs nesting there. He also found the species along the Green River Valley and gave specific observations at Ouray on July 28, 1937; Duchesne River, 10 miles northwest Ouray, August 8, 1937; and Hill Creek, 40 miles south of Ouray on August 5, 1937. He also observed the species on the Yampa River at Beaver Creek, 7 miles northwest of Ladore, Moffat County, Colorado.

Behle and Ghiselin (1958: 3) collected two specimens at Roosevelt, February 13 and Myton, February 28, 1956. One was also observed at Faxon Lake 10,900 feet, Naturalist Basin, Uinta Mountains. Hayward (1967: 23) doesn't give any records for the Tavaputs Plateau area but comments that the species is more likely to be found around fields and pastureland or near streams where

diurnal rodents are available for food, and less commonly over open deserts. However, it may be seen most anywhere, especially during the non-nesting season. University of Utah personnel obtained sight records as follows: Pelican Lake, March 27, 1966, July 22, 1966, and March 20, 1967; Ouray National Wildlife Refuge, March 19, 20, 22, 1966, and March 20, 1967; two, about 20 miles south of Ouray on Hill Creek, July 22, 1966; one between Towave and Weaver reservoirs, July 23, 1966.

Trends - None evident. Common in the general region even though less common in the oil shale area.

Ecology -

A. Habitat preference: As its name suggests the Marsh Hawk occurs at marshes, especially for nesting, but also forages widely out over dry terrain such as farmlands, flatlands and benchlands. However, they are less common in the drier areas such as the oil shale region. The records we obtained there were all in the early fall when there tends to be even wider post breeding season wandering. They were foraging over desert scrub.

B. Number of nest site locations: None. It is doubtful that the species breeds in Zone 1.

C. Food and food relations: May (1935) states that the diet of the marsh hawk is quite varied, though it is a very light and rather weak bird for its apparent bulk. It rarely attacks birds or mammals of any size unless they are wounded or sick. According to A. K. Fisher (1893) its food consists largely of small rodents, such as meadow mice, half-grown squirrels, rabbits and spermophiles or ground squirrels. In addition it preys upon lizards, frogs, snakes, insects, and birds. Of the latter, small ground-dwelling species are taken. When hard pressed it is said to feed on offal and carrion. It occasionally preys upon dead or wounded ducks left by gunners. H. L. Ferguson in 1922 noted that 44 per cent of stomachs analyzed contained mammals

and 90% birds. A. L. Stoddard in 1931 collected 1098 pellets at a Marsh Hawk roost and his analysis yielded the following results: 925 (84%) contained cotton rats (which, as Stoddard points out, are extremely dangerous to nesting quail), eight other mammals were found, 138 (12.6%) held remains of 36 species of birds; 15 held snakes and 15 insects. May concludes his discussion by giving following stomach content analysis: Total examined 418, mammals 259, poultry or game 10, other birds 176, other vertebrates 27, insects 11, empty 26.

Mc Atee (1935) reports that among birds used as food, remains of poultry were found in 20 of the 601 stomachs he examined. Upland game birds had been taken as follows: European partridge 1, sharp-tailed grouse 1, valley quail 1, ruffed grouse 4, bobwhite 4, pheasants 10. In 4 stomachs remnants of pintail ducks occurred. Other birds utilized were as follows: rails 4, snipe 5, woodcock 1, as well as a number of sandpipers. Small birds were found in 265 of the 601 stomachs studied. They included song sparrows in 62, towhees in 27, chipping sparrows 26, sharp-tailed sparrows 26, meadow larks 12, bobolinks 9, robins 18, screech owls 4, least bittern 1, and poorwill 1. Among mammals, one of the principal food items is the rabbit with 62 records in 601 stomachs studied. Mice, however, were the most frequent item. Meadow mice (up to 5 individuals in one stomach) were found in 173 stomachs, house mice in 5, deer mice and jumping mice in 33, house rats 12, cotton rats 4, wood rats 2. Ground squirrels and pocket gophers (well known rodent pests of the West) were found in 19, other squirrels 6, shrews 12, muskrats 2, and skunk 1. The marsh hawk appears to take snakes when the opportunity is provided since 13 stomachs contained snakes. Frogs appeared in 15 and a crawfish in 1. Grasshoppers were eaten by 15 and other insects were recorded in 24.

Bent (1937) says that the marsh hawk is regarded by many as a highly beneficial species, mainly because of the large numbers of mice, rats, and other

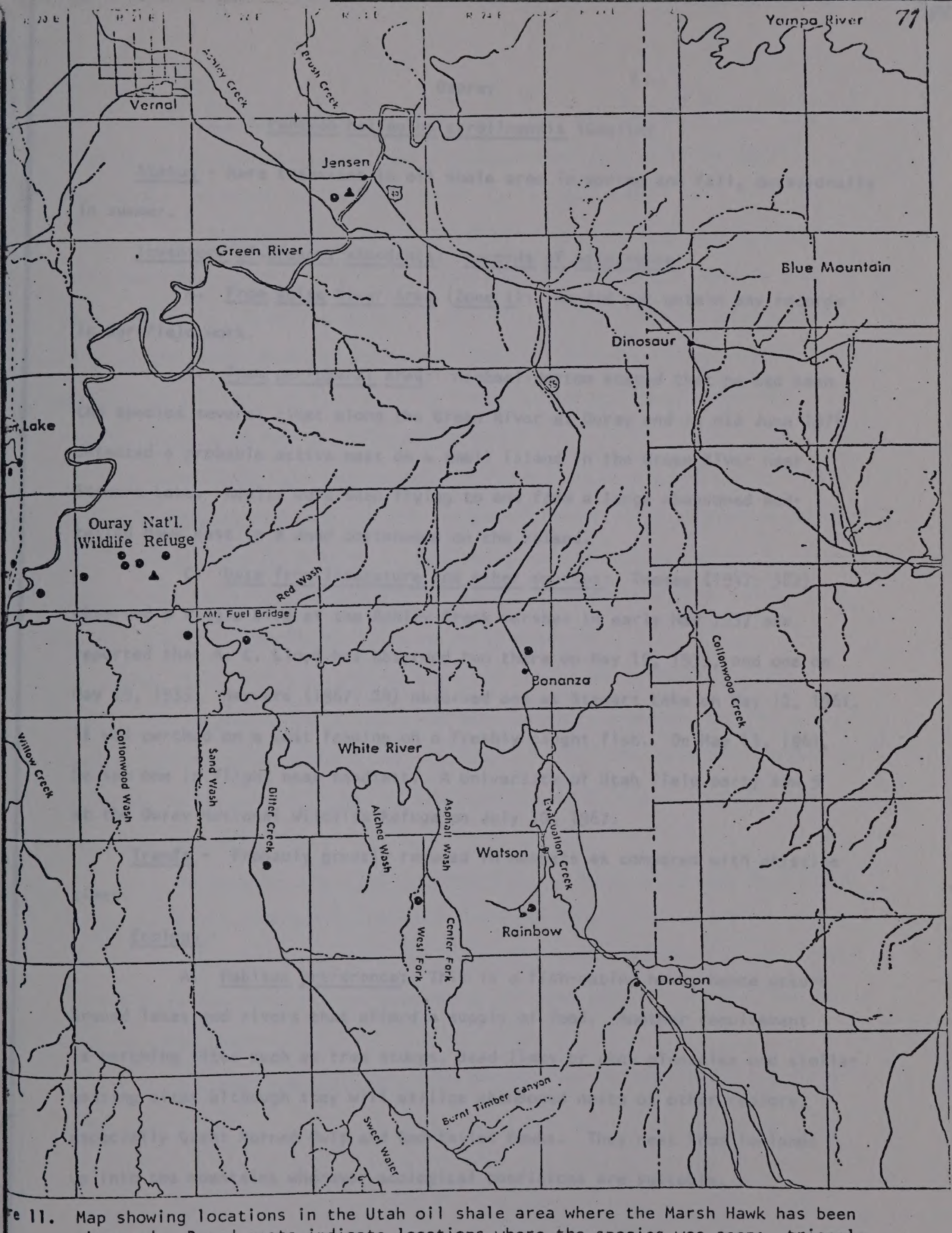
injurious small mammals it destroys. It certainly is a great mouser; it lives largely on frogs and small snakes and destroys many injurious insects as well. The record shows, however, that it also takes many small birds and an occasional large one. A stomach analysis study gave the following results: total stomachs examined 124, poultry 7, other birds 34, mice 57, other mammals 22, reptiles 7, frogs 2, insects 14, while 8 were empty. Among mammals taken are rabbits, young skunks, pocket gophers, rats, ground squirrels, other squirrels, shrews, moles, meadow mice, house mice, and jumping mice. Birds eaten include bittern, green heron, teal and other ducks, coot, rails, grouse, quail, partridge, pheasants, plovers, sandpipers, woodcock, snipe, sparrow hawk, screech owl, flicker, doves, starling, meadowlark, bluebirds, grackles, numerous sparrows, cardinal, towhees, warblers, wrens, mockingbird, catbird, robin and thrushes. It also eats frogs, snakes, lizards, grasshoppers, locusts and crickets. It would be safe to say the marsh hawk preys on most species indigenous to the marsh environment.

The Craigheads (1956) give the following table for the marsh hawk foods habits.

Prey species	Number of prey individuals in pellets		% of all individuals in pellets	
	1942	1948	1942	1948
meadow mouse	7011	424	93.2	98.1
white-footed mouse	256	7	3.4	1.6
other mice	7		.1	
shrews	128		1.7	
rabbit	26		.34	
small birds	76		1.0	
garter snakes	21	1	.27	.3
Total	7525	432	100	100

D. Feeding sites and foraging areas in terms of habitat preference: In the general area, marshes such as at the mouth of Ashley Creek and the Ouray National Wildlife Refuge as well as flatlands, especially farming areas. Virtually none in the oil shale area except around Ouray.

E. Food availability: High for the general region, low for the oil shale area.


Yampa River
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Ashley Creek
Brush Creek
Jensen
Green River
Blue Mountain
Dinosaur
Lake
Ouray Nat'l. Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Bonanza
Cottonwood Creek
White River
Willow Creek
Cottonwood Wash
Sand Wash
Dillor Creek
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
Rainbow
West Fork
Center Fork
Dragon
Burnt Timber Canyon
Sweet Water

e 11. Map showing locations in the Utah oil shale area where the Marsh Hawk has been observed. Round spots indicate locations where the species was seen; triangle indicates a nesting site.

Osprey

Pandion haliaetus carolinensis (Gmelin)

Status - Rare transient in oil shale area in spring and fall, occasionally in summer.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): We did not obtain any records in our field work.

B. From peripheral area: Michael Horton stated that he had seen the species several times along the Green River at Ouray and in mid June 1974 detected a probable active nest on a small island in the Green River near Stewart Lake. Adults were seen flying to and from a large abandoned Red-tailed Hawk nest in a dead cottonwood on the island.

C. Data from literature and other sources: Twomey (1942: 382) observed a single bird at the Ashley Creek marshes in early May 1937 and reported that A. C. Lloyd had observed two there on May 15, 1935, and one on May 19, 1935. Hayward (1967: 24) observed one at Stewart Lake on May 12, 1961. It was perched on a post feeding on a freshly caught fish. On May 13, 1961, he saw one in flight near Randlett. A University of Utah field party saw 5 at the Ouray National Wildlife Refuge on July 10, 1967.

Trends - Probably greatly reduced in numbers as compared with pristine times.

Ecology -

A. Habitat preference: This is a fish-eating hawk, hence occurs around lakes and rivers that afford a supply of food. Another requirement is perching sites such as tree stumps, dead limbs or rock pinnacles and similar nesting sites although they will utilize abandoned nests of other raptors, especially Great Horned Owls and Red-tailed Hawks. They nest from lowlands up into the mountains wherever ecological conditions are suitable.

B. Number of nest site locations: None for the White River area (Zone 1) but as previously mentioned a probable nesting site to the north near Jensen, an island in the Green River near Stewart Lake

C. Food and food relations: Fish of various types depending upon those available, either trash fish or game species. May (1935) reports that only rarely does the osprey deviate from a diet of fish. The deviants include reptiles and frogs which infest swamps. The fish consumed are usually of an inferior quality. In Florida it is almost always catfish and near the Pacific Coast it is to a great extent suckers.

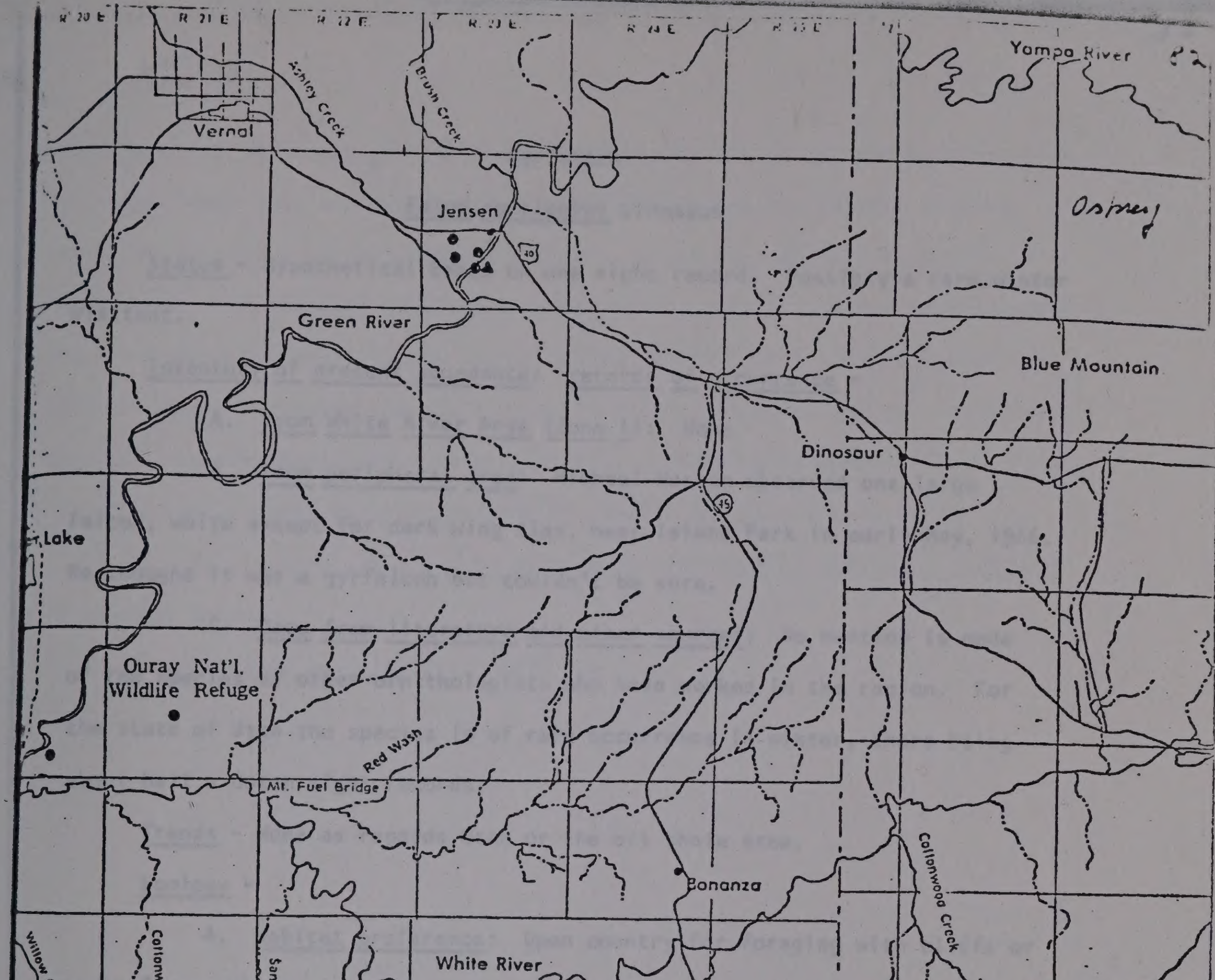
Mc Atee (1935) says that apparently fishes made up the whole prey of the 33 osprey stomachs examined. Of the freshwater fishes taken, suckers were found in 10, yellow perch 5, goldfish 2, sunfish 1, striped bass 1, catfish 1. Salt water fishes taken include menhaden 5, tom cod 1, flatfish 1, triggerfish 1. Unidentified fish remains were present in 11 stomachs.

Bent (1937) explains that fish are the almost exclusive food of the osprey, the following having been recorded: herring, bluefish, bonefish, bonito, bowfin, carp, catfish, eel, flounder, flying fish, goldfish, hornpout, menhaden, mullet, perch, pickerel, pike, salmon, shad, sucker, sunfish, tom cod, trout and whitefish.

D. Feeding sites and foraging areas in terms of habitat preference: Primarily the Green River and possibly the White River in the oil shale area. For the surrounding region, Pelican Lake, Bottle Hollow Reservoir, small lakes in the Uinta Mountains such as Green Lake, but most important of all, the vast Flaming Gorge Reservoir.

E. Food availability: High for the region, low for the oil shale area.

Osprey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R 25 E
Yampa River
Vernal
Ashley Creek
Brush Creek
Jensen
40
Green River
Blue Mountain
Dinosaur
45
Lake
Ouray Nat'l. Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Bonanza
Cottonwood Creek
White River
Willow Creek
Cottonwood Wash
Sand Wash
Dilter Creek
Alchee Wash
Asphalt Wash
Evacuation Creek
Watson
West Fork
Center Fork
Rainbow
Dragon
Burnt Timber Canyon
Sweet Water

e 12. Map showing locations in the Utah oil shale area where the Osprey has been observed. Round spots indicate locations where the species was seen; triangle indicates a nesting site.

Gyrfalcon

Falco rusticolus Linnaeus

Status - Hypothetical based on one sight record. Possibly a rare winter visitant.

Inventory of present abundance: *records of occurrence* -

A. *From White River Area (Zone 1):* None

B. *From peripheral area:* Michael Horton observed one large falcon, white except for dark wing tips, near Island Park in early May, 1966. He thought it was a gyrfalcon but couldn't be sure.

C. *Data from literature and other sources:* No mention is made of the species by other ornithologists who have worked in the region. For the state of Utah the species is of rare occurrence in winter, there being about half a dozen sight records.

Trends - None as regards Utah or the oil shale area.

Ecology -

A. *Habitat preference:* Open country for foraging with cliffs or trees for perching.

B. *Number of nest site locations* - None. Breeds in the far northern arctic tundra.

C. *Food and food relations:* According to May (1935) ptarmigan are their favorite food but they will feed on most anything including fox-bait among mammals. Lemmings seem to have priority over much of their breeding range as a primary food source. The results of stomach contents reveal the following: Total examined 17, mammals 5, poultry or game 3, other birds 2, empty 7. It has been suggested that the following are food (prey) species for the gyrfalcon: hares, ptarmigan, grouse, waterfowl, shorebirds, and other birds and mammals of medium size. Bent (1937) reports that the two species of

ptarmigan seem to furnish the principal food supply of the gyrfalcon, especially in winter when they are the only prey available in the far north. It also feeds in the spring on the abundant lemmings of the area as well as arctic hares. The food items he gives include sea birds, puffins, murres, guillemots, and kittiwakes. Gyrfalcons are strong enough to kill ducks and even geese. Smaller land birds taken include ringed plovers, phalaropes, snipes, turnstones, dunlins, purple sandpipers, and snow buntings. Nothing is known of their food in Utah. It probably consists largely of rabbits and upland game birds.

D. Feeding sites and foraging areas in terms of habitat preference: Apparently none.

E. Food availability: Moderate.

Prairie Falcon

Falco mexicanus Schlegel

Status - Uncommon permanent resident

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Six records: Four miles south of Bonanza, R24E T10S Sec. 12, May 26, 1974; White River at mouth of Bitter Creek, R22E T10S Sec. 12, June 12, 1974; White River at mouth of Asphalt Wash, R23E T10S Sec. 24, August 31, 1974; White River, R23E T10S Sec. 26, April 20, 1975; Southam Canyon, R24E T10S Sec. 21, May 23, 1975; two adults and active nest with four young, Southam Canyon, R24E T10S Sec. 26, June 10, 1975.

Phil Wagner (pers. comm.) reported another nest along the White River, north of Cowboy Canyon, R25E T9S Sec. 27, June 11, 1975.

B. From peripheral area: The species was also observed at five miles northeast of Bonanza on August 22, 1974, and May 2, 1975; along White River, four miles southeast of the Mountain Fuel Supply Company bridge, R22E T9S Sec. 27 on June 17, 1974, and April 20, 1975, and an active aerie discovered there on May 25, 1975; head of Sand Wash, September 7, 1974.

C. Data from literature and other sources: Twomey (1942: 382) took a female from a nest containing two eggs located five miles south of Jensen and 3/4 mile east of the Green River but no date was specified. He reported that the species was comparatively numerous in the "bad-land" sections of the basin, particularly between Jensen and Bonanza. Many evidences of old nests were found. The one occupied nest was situated on a deep rocky shelf that extended back into the face of the cliff. The upper face of the cliff overhung the nest shelf by four or five feet. There was a drop of fifty feet from the nest to the base of the cliff. The nest was safe from predators and virtually inaccessible to humans. In September several individuals were observed by Twomey along the Green River above and below Jensen. Behle and

Ghiselin (1958: 3) report a specimen taken 15 miles south of Myton on April 24, 1938.

Prairie Falcons are listed as an occasional resident of the Ouray National Wildlife Refuge, present all seasons. Phil Wagner saw the species during 1974-75 along Willow Creek south of Ouray and in Pleasant Valley south of Myton Bench. Michael Horton states that he sees these falcons fairly commonly in the Uinta Basin during the winter in the area from U. S. Highway 40 south to Ouray. He has been told that there are several nests in the Flaming Gorge area.

Trends - None evident. The species is still fairly common in the region.

Ecology -

A. Habitat preference: The Prairie Falcon is a bird of the arid desert country selecting desert lowlands as favorite hunting areas. It is frequently found nesting in higher desert mountains in potholes, ledges of cliffs and at buttes and mesas.

B. Number of nest site locations: Three as follows: Four miles southeast of Mountain Fuel Supply Company bridge, R22E T9S Sec. 27, May 25, 1975; White River, north of Cowboy Canyon, R25E T9S Sec. 27, June 11, 1975 (Phil Wagner (pers. comm.); Southam Canyon, R24E T10S Sec. 26, June 10, 1975 (nest contained four young).

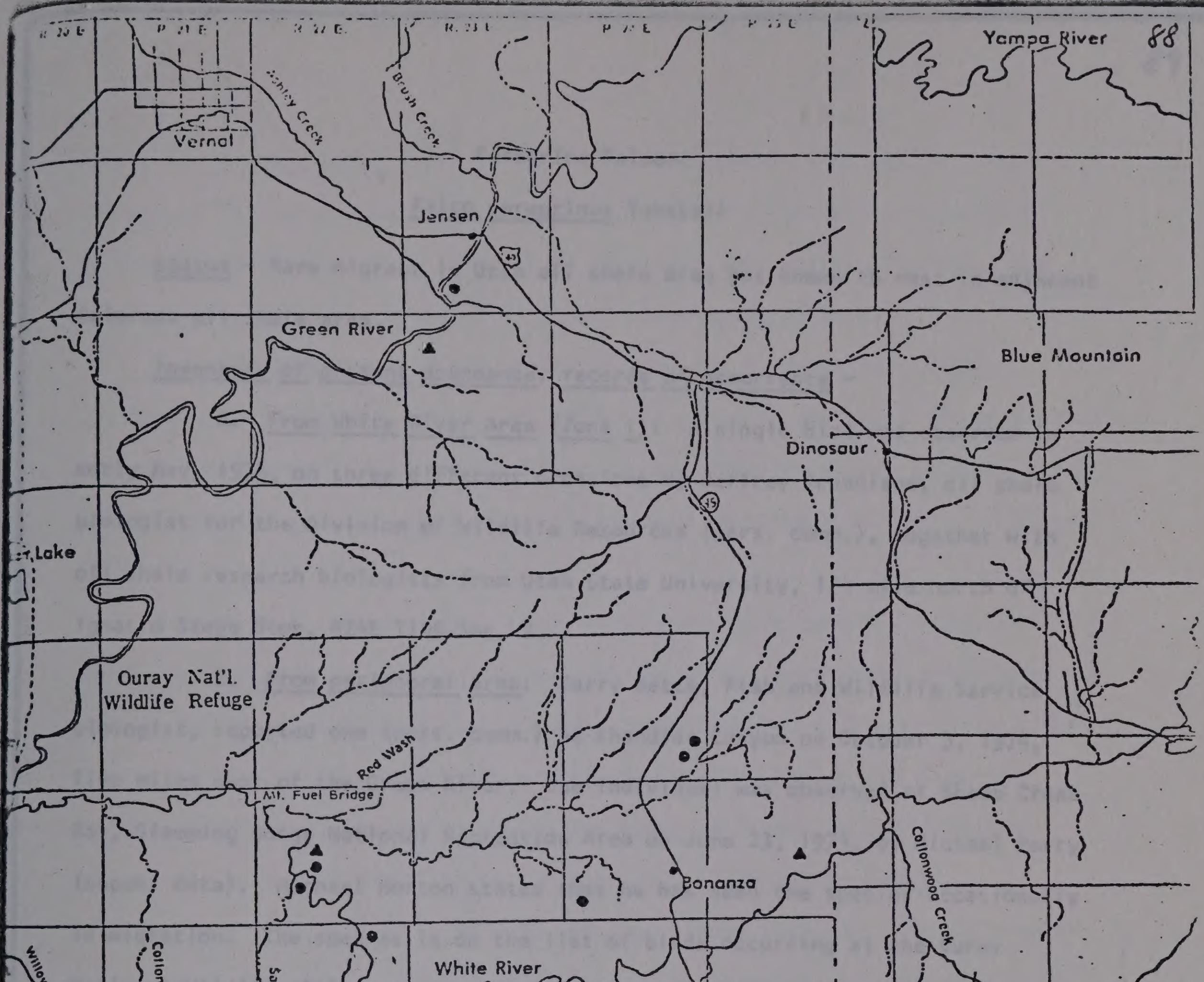
C. Food and food relations: May (1935) reports that the Prairie Falcon feeds principally on birds and mammals with an occasional reptile or large insect taken. The list of prey species includes: pheasants, doves, blackbirds, mallards, teal, sharp-tailed grouse, poultry, Gambel's sparrows, meadowlarks, valley quail. Mammals are gophers, prairie dogs, rabbits and mice. It occasionally eats lizards, crickets and grasshoppers. Results of a stomach analysis were as follows: Total examined 40, mammals in 13, poultry or game in 11, other birds in 13, insects in 5, empty 6.

Mc Atee (1935) says of the 15 stomachs available to him for study, 7 contained bird remains only, 5 mammals only, 1 both these types of food, 1 a bird, 1 an insect, and 1 a mammal and insects. The birds identified were hooded merganser, prairie chicken, Gambel's quail, pigeon, mourning dove, Crissal thrasher, horned larks, and savannah sparrow. The mammals included spermophiles, prairie dog, meadow mice, and deer mice. Insects eaten were grasshoppers.

Bent (1937) suggests that a large part of the Prairie Falcon's diet consists of birds of all varieties, Gambel's sparrow, western meadowlark, band-tailed pigeons, mourning doves, Gambel and valley quail heading the list. He reports isolated attacks on poultry but not when wild game is abundant. Other bird species taken include blackbirds of all varieties, sparrows, thrushes, and horned larks. It is capable of killing prey much larger than itself and frequently does kill rabbits and pheasants. Other mammals taken include gophers, squirrels, mice and voles. It occasionally will eat grasshoppers.

D. Feeding sites and foraging areas in terms of habitat preference: No special areas determined. Prairie Falcons forage widely in the territory about the nesting sites.

E. Food availability: Moderate.


R 20 E
R 21 E
R 22 E
R 23 E
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Yampa River
Ashley Creek
Brush Creek
Vernal
Jensen
40
Green River
Blue Mountain
Dinosaur
45
Lake
Ouray Nat'l.
Wildlife Refuge
Red Wash
Alt. Fuel Bridge
Bonanza
Cottonwood Creek
Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
White River
Asphalt Wash
Atchee Wash
Evacuation Creek
Watson
West Fork
Center Fork
Rainbow
Dragon
Burnt Timber Canyon
Sweet Water

13. Map showing locations in the Utah oil shale area where the Prairie Falcon has been observed. Round spots indicate locations where the species was seen; triangles indicate nesting sites.

Peregrine Falcon

Falco peregrinus Tunstall

Status - Rare migrant in Utah oil shale area but known to nest in adjacent Colorado oil shale area.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): A single bird was observed in early May, 1975, on three different occasions by Jeffrey Grandison, oil shale biologist for the Division of Wildlife Resources (pers. comm.), together with oil shale research biologists from Utah State University, 1/4 mile north of Ignatio Stage Stop, R24E T10S Sec. 2.

B. From peripheral area: Barry Betts, Fish and Wildlife Service biologist, reported one (pers. comm.) at Chandler Canyon on October 3, 1974, five miles east of the Green River. One individual was observed at Sheep Creek Bay, Glamming Gorge National Recreation Area on June 23, 1974, by Michael Perry (unpub. data). Michael Horton states that he has seen the species occasionally in migration. The species is on the list of birds occurring at the Ouray National Wildlife Refuge as rare during all seasons.

C. Data from literature and other sources: Twomey (1942: 382) reported two specimens taken on unspecified dates, one from 12 miles east of Vernal, the other 2 miles south of Jensen. One was a male with adult plumage beginning to show on the breast, belly, head, back and rump. The other was a female in full adult plumage. He found the species to be common in May and early June at the Ashley Creek marshes. In the evening, just at dusk one or more would fly swiftly over his camp, approaching from the southeast where there were some cliffs east of the Green River. A search of the area yielded one inaccessible nest located on a shelf about forty feet up a cliff. The actions of the pair of adults indicated young in the nest. Immature peregrines were seen at the Ashley Creek marshes early in August. Twomey commented that there was

always one or more peregrines in the vicinity of Jensen from August until the end of September. He reported that A. C. Lloyd collected three males at the Ashley Creek marshes on April 23, August 5, and August 23, 1935. The species was also seen along Hill Creek, 40 miles south of Ouray.

A field party from the University of Utah saw a peregrine 1/4 mile southeast of Pine Spring on July 10, 1966. It was seen several times at close range. The identification was positive. On one occasion it was carrying a small jackrabbit through the trees. This record was noted by Porter and White (1973: 5).

Investigators of oil shale areas in Colorado have observed peregrines on the Roan Plateau in the general area of the Colony Development Operation. One was observed on October 4, 1973, near the headwaters of Stuart Creek. This was probably a migrant. However, a pair was resident during the summer of 1973 in East Fork Canyon which reared two young to flight stage. The pair ranged throughout the East and East Middle Fork of Parachute Creek.

Trends - The several specimens noted by Twomey together with his observations of the abundance of the species in 1937 as compared with the paucity of our records 37 years later suggests that the numbers of this raptor have declined markedly in the last few decades.

Ecology -

A. Habitat preference: The peregrine is generally found closely associated with water either along marshes, streams or rivers but will nest within one half to one mile from water.

B. Number of nest site locations: None.

C. Food and food relations: It preys upon a variety of shorebirds as well as other small birds. Occasionally rodents are preyed upon as well as a few insects.

May (1935) says the duck hawk is known throughout its range as a killer of birds, seldom deviating from this diet for small mammals or other prey.

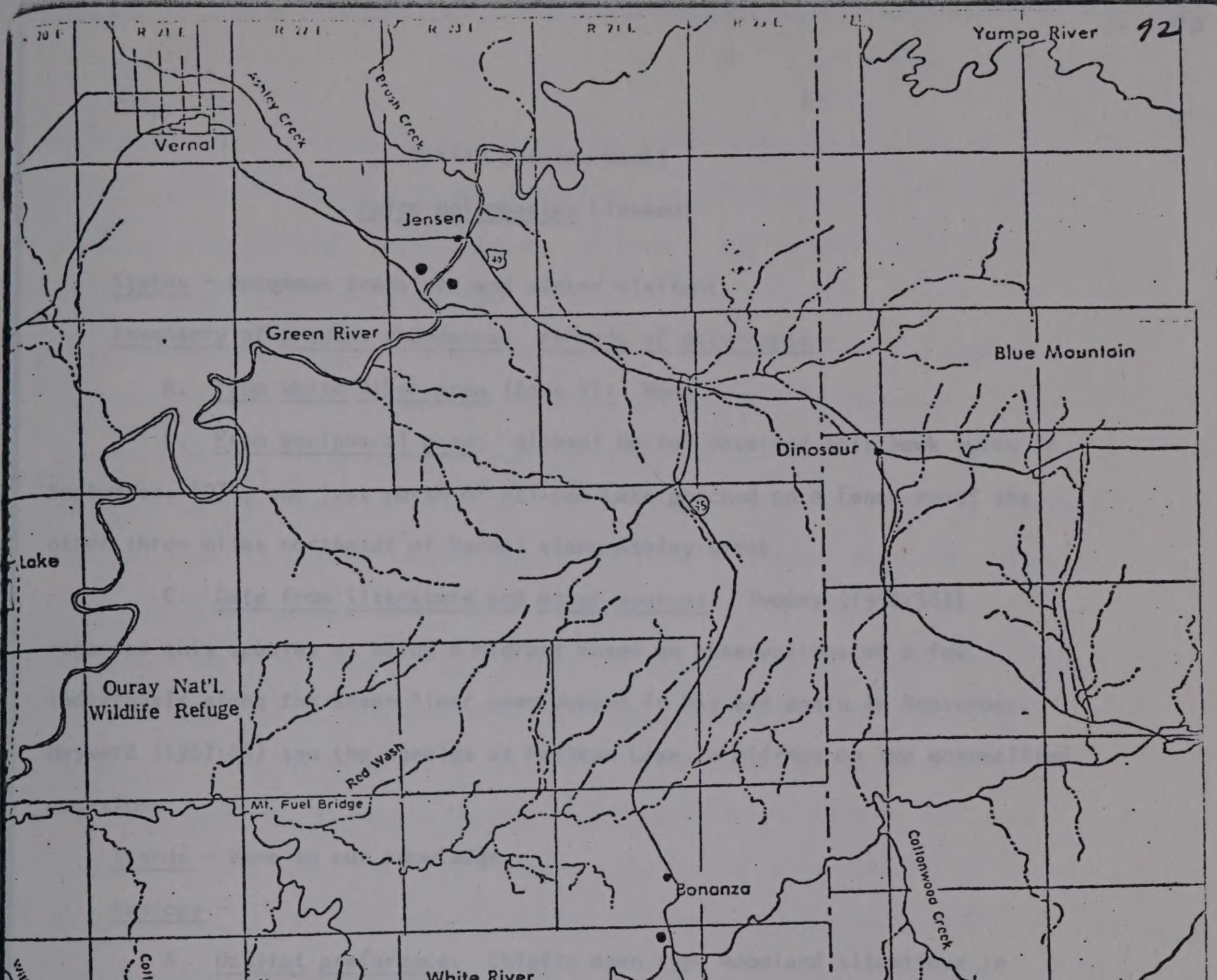
Waterfowl and shore birds make up a majority of this bird's diet. Where a duck hawk resides in near proximity to man, pigeons make up a good part of the diet. The diet includes pigeons, ruffed grouse, flickers, blue jays, kingfishers, night hawks, robins, sparrows, rough-winged swallows, meadowlarks, bluebirds, goldfinches, kingbirds, nuthatches, grosbeaks, tanagers, mourning doves, phoebes, veeries, and various warblers. From a pellet examination the following remains were identified: mallard, meadow mice, woodchucks, black ducks, green herons, gallinule, killdeer, ruffed grouse, night hawk, blue jay, black-billed cuckoo, meadowlark, kingfisher, scarlet tanager, brown thrasher, flicker, cinnamon teal, snow bunting, Franklin's gull, ring-necked pheasant. The results of stomach analysis revealed the following: Total examined 102, mammals 3, poultry or game 11, other birds 70, insects 12, empty 9.

Mc Atee (1935) reports that of the 57 duck hawk stomachs examined 53 contained birds. The bird remains consisted of pintails 2, cinnamon teal 1, other duck 6, chickens 3, Gambel's quail 1, mourning dove 2, killdeer 3, snowy plover 3, upland plover 1, solitary and least sandpiper 5, yellowlegs 2, avocet 4, northern phalarope 2, rose-breasted grosbeak 6, redpoll 1, lark sparrow 1, song sparrow 2, chipping sparrow 2, meadowlark 7, flickers 5, and night hawks 1. Mammals included the following: Mice 1 and spermophiles 1. Insects included grasshoppers, crickets, dragonfly, and wood-borers.

Bent (1938) says the duck hawk is primarily a bird killer, nearly all its food consisting of birds, ranging in size from mallard ducks down to warblers and nuthatches. Mammals form an insignificant part of the peregrine diet.

D. Feeding sites and foraging area in terms of habitat preference: The entire area along and adjacent to the White River in Utah and the Green River.

E. Food availability: Moderate.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Sand Wash
Diller Creek
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
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Center Fork
West Fork
Dragon
Burnt Timber Canyon
Sweet Water

e 14. Map showing locations in the Utah oil shale area where the Peregrine Falcon has been observed

Merlin (Pigeon Hawk)

Falco columbarius Linnaeus

Status - Uncommon transient and winter visitant.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1): None.

B. From peripheral area: Michael Horton observed this hawk twice in September, 1974, one just north of Pelican Lake perched on a fence post; the other three miles northeast of Vernal along Ashley Creek.

C. Data from literature and other sources: Twomey (1942:383) regarded this species as being a migrant based on observations of a few individuals along the Green River near Jensen in May and again in September. Hayward (1967:24) saw the species at Pelican Lake in mid-May on two unspecified occasions.

Trends - None to our knowledge.

Ecology -

A. Habitat preference: Chiefly open type woodland situations in valleys and river bottom lands where scattered clumps of trees grow.

B. Number of nest site locations: None since the species does not breed in this area.

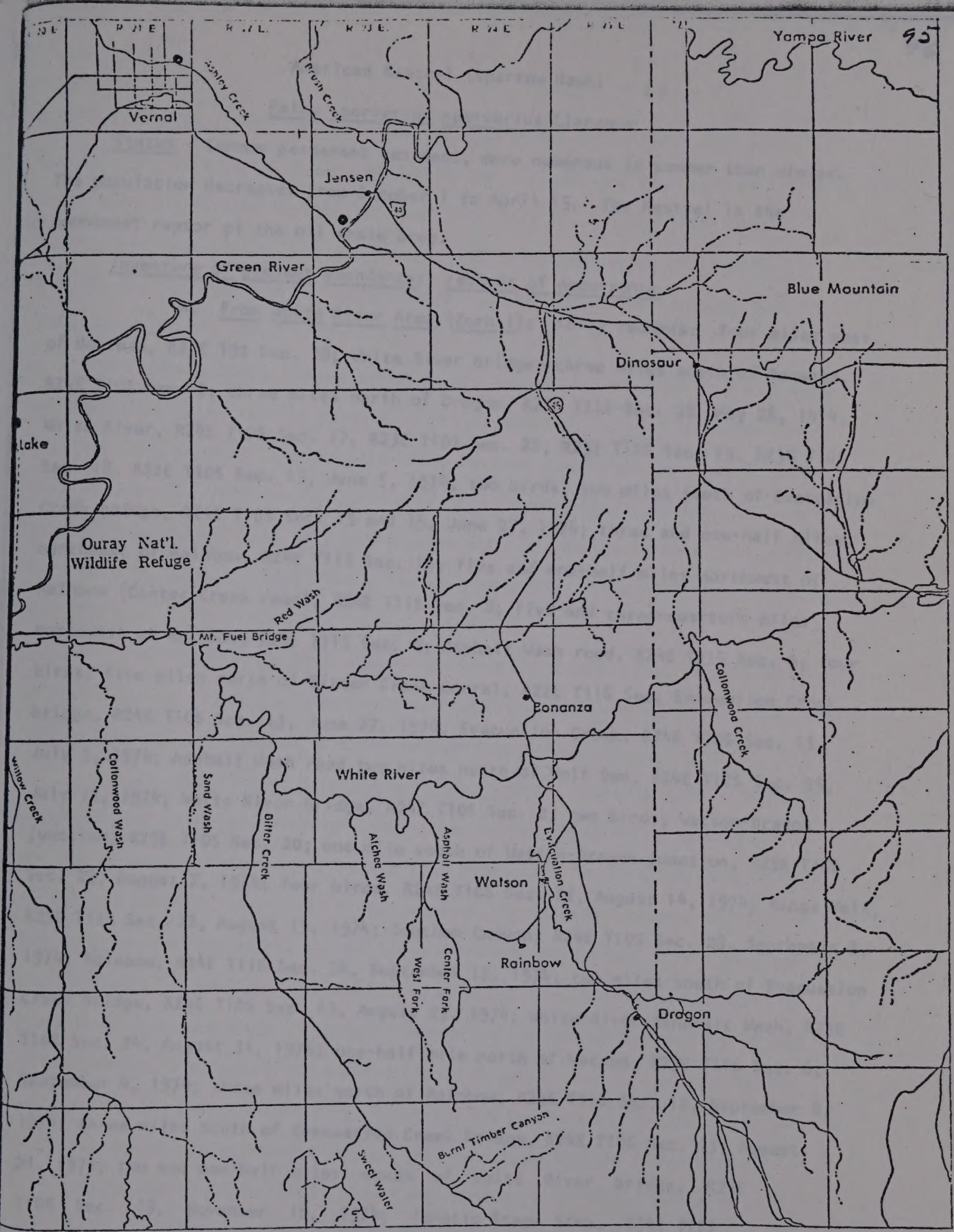
C. Food and food relations: May (1935) says that the pigeon hawk is a confirmed killer of birds, and it will only occasionally catch other forms of food. It has been rated as a killer of the now extinct passenger pigeon. A stomach analysis of 41 birds from New Jersey found three mammals, 34 birds, and 119 insects. Of 298 stomachs examined from New York, 318 birds were found in them, four mammals and 967 insects. It was therefore determined that 89.2% of their food was birds, 9.8% insects, and 1% mammals. The results of May's stomach analysis shows the following: Total examined - 184; mammals in

eight, poultry or game in three, other birds in 141, other vertebrates in three, insects in 68 and 19 empty. The kinds eaten included pigeons, flickers, grackels, pine grosbeak, house sparrow, chickadees, robin, cliff swallow, tree swallow, grasshoppers and small voles.

McAtee (1935) reports that of the birds consumed, remains of a chicken were found in only one stomach; the same was the case for the domestic pigeon. The mourning dove and woodcock were the only game birds represented. It is worth noting that these are also the largest kinds of prey identified in stomachs. Warblers head the list of smaller species captured by pigeon hawks, the genus *Dendroica* being represented by 119 identifications. Other warblers were in 19, ovenbirds in 9, the genus *Wilsonia* in 9, yellow throat in 6, and other types in fewer cases. The next most prevalent group is sparrows in the genus *Melospiza*. These appeared in 73 out of 727. Next came English (house) sparrows in 38, *Spizella* in 38, purple finches in 13, juncos in 8, robins in 19, bluebirds in 6, other thrushes in 55, chimney swifts in 13, tree swallows in 14, barn swallows in 15, cedar waxwings in 28, red-breasted nuthatches in 28, vireos in 40. Others included meadowlark, flicker, blue-gray gnatcatcher, ruby-crowned kinglet. Insects were found in 389 stomachs, consisting of dragonflies, butterflies, crickets and grasshoppers. Mammals included bats in 7, mice in 5, shrews in 3, deer mice in 2, spermophile in 1, house mouse in 1, and red-backed mouse in 1. Other vertebrates were toads in 3 and garter snakes in 4. Bent (1937) reports that the pigeon hawk is mainly a bird eater. Of 55 stomachs examined, 2 contained poultry, 41 small birds, 2 mice and 16 insects.

D. Feeding sites and foraging areas in terms of habitat preference: No special areas.

E. Food availability: Moderate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Bitter Creek
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Asphalt Wash
Watson
Evacuation Creek
Rainbow
West Fork
Center Fork
Dragon
Burnt Timber Canyon
Sweet Water

e 15. Map showing locations in the Utah oil shale area where the Merlin (Pigeon Hawk) has been observed

American Kestrel (Sparrow Hawk)

Falco sparverius sparverius Linnaeus

Status - Common permanent resident, more numerous in summer than winter. The population decreases from October 1 to April 15. The Kestrel is the commonest raptor of the oil shale area.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Forty records: Four miles east of Bonanza, R25E T9S Sec. 28; White River bridge—three miles south of Bonanza, R24E T10S Sec. 2; three miles north of Dragon, R25E T11S Sec. 28, May 26, 1974; White River, R24E T10S Sec. 17, R23E T10S Sec. 22, R23E T10S Sec. 19, R23E T10S Sec. 18, R22E T10S Sec. 13, June 5, 1974; two birds, two miles south of Evacuation Creek bridge, R24E T10S Sec. 13 and 15, June 27, 1974; three and one-half miles northwest of Rainbow, R24E T11S Sec. 16; five and one-half miles northwest of Rainbow (Center Creek road), R24E T11S Sec. 8; five and three-quarters miles northwest of Rainbow, R24E T11S Sec. 8; Asphalt Wash road, R24E T11S Sec. 6; four birds, five miles north of Bitter Creek Corral, R22E T11S Sec; Evacuation Creek bridge, R24E T10S Sec. 13, June 27, 1974; Evacuation Creek, R24E T10S Sec. 13, July 3, 1974; Asphalt Wash road two miles north of Wolf Den, R24E T12S Sec. 35, July 12, 1974; White River bridge, R24E T10S Sec. 2; two birds, Watson-Dragon junction, R25E T10S Sec. 20; one mile south of Watson-Dragon junction, R25E T10S Sec. 29, August 2, 1974; four birds, R24E T10S Sec. 22, August 14, 1974; Kings Well, R23E T11S Sec. 22, August 13, 1974; Southam Canyon, R24E T10S Sec. 28, September 8, 1974; Rainbow, R24E T11S Sec. 24, September 12, 1974; two miles south of Evacuation Creek bridge, R24E T10S Sec. 13, August 23, 1974; White River-Ashphalt Wash, R23E T10S Sec. 24, August 31, 1974; one-half mile north of Watson, R25E T11S Sec. 6, September 4, 1974; three miles north of Rainbow, R24E T11S Sec. 12, September 4, 1974; three miles south of Evacuation Creek Bridge, R24E T10S Sec. 13, August 21, 1974; two and one-half miles south of White River bridge, R24E T10S Sec. 13, November 16, 1974; Ignatio Stage Stop, R24E T10S

Sec. 13, December 12, 1974; two birds, Dragon, R25E T12S Sec. 13, February 26, 1974; White River, R24E T10S Sec. 17 and Sec. 18, April 20, 1975; White River, R23E T10S Sec. 22 and R23E T10S Sec. 12, May 23, 1975; White River, R23E T10S Sec. 18 and 19, May 24, 1975; Southam Canyon, R24E T10S Sec. 28 and Sec. 32, May 24, 1975; Southam Canyon, R24E T10S Sec. 28, June 10, 1975; White River, R24E T10S Sec. 21, June 11, 1975.

Phil Wagner (pers. comm.) reported the following: one bird at White River, one-half mile below Ignatio Stage Stop, R24E T10S Sec. 2, June 10, 1975; three-quarters mile south of Ignatio Stage Stop on Bonanza-Rainbow road, R24E T10S Sec. 1, June 11, 1975; one mile north of White River, R24E T10S Sec. 4, June 11, 1975; two miles south of Ignatio Stage Stop on Bonanza-Rainbow road, R24E T10S Sec. 12, June 10, 1975; two miles west of Watson, R24E T11S Sec. 11, June 10, 1975.

B. From peripheral area: Two birds at Mountain Fuel Supply Company bridge, June 10, 1974; ten birds between Highway 40 turn-off to Bonanza and Little Bonanza (all perched on different utility poles), May 2, 1975.

C. Data from literature and other sources: Twomey (1942: 383) reported nine specimens obtained, some taken in the Uinta Basin near Jensen and two miles south of Jensen, others from Green Lake in the Uinta Mountains. He further reported that A. C. Lloyd observed the species commonly at the Ashley Creek marshes during the spring and summer of 1934 and 1935. Although the species is a permanent resident, Twomey noted some migratory movements in that these hawks appeared in largest numbers in the spring between May 15 and 30 followed by a dispersal throughout the basin after June 1. In the autumn Kestrels become more numerous from September 15 to 30 at which time there was a gradual southward movement along the valley creeks and the Green River.

Behle and Ghiselin (1958) observed a Kestrel near timberline east of Rock Sea Pass, 11,000 feet, at the head of Rock Creek, Duchesne County, on

August 17, 1953. Hayward (1967: 24) states that this falcon is very common throughout the Upper Colorado River Basin. Most of his 40 records fell between April and into August. A check-list for the birds of Ouray National Wildlife Refuge indicates that Kestrels are common on the refuge during summer and fall months, rare in winter and occasional in spring.

Three specimens from the oil shale area are in the University of Utah collection. One was taken one mile south of Pelican Lake on July 7, 1966, one along the Green River, one mile east of Ouray on July 17, 1967, and the third at 10 miles north of Pine Springs, 30 miles southeast of Ouray on July 13, 1967. The species was observed by University of Utah field parties in several ecological situations, namely foraging over open, desert country, in the juniper-pinyon pine forest and in cottonwoods along the river bottomlands. It nested in abandoned woodpecker holes in trees and on rock ledges. Specific localities where the species was observed are as follows. Unless otherwise specified only one was seen at each location. Pelican Lake, one on May 27, one on July 7, and four on July 22, 1966, and March 20 and June 29, 1967; Ouray National Wildlife Refuge, March 19, 21 and 22, 1966, and March 20 and 21, 1967; Ouray on March 21, 1967; ten at one mile east Ouray on July 17, 1967; junction White and Green rivers, one mile south Ouray, March 22, 1967; Flat Rock mesa, July 25, 1967; Monument Ridge, July 8, 1966; Mormon Ridge, July 25, 1966; McCook Ridge, July 13, 1966; South Canyon, July 12, 1966; 50 on Mason Ridge road between Weaver and Towave reservoirs on July 29, 1966; Towave Reservoir on July 26, 1967.

Trends - Abundant in the area now and probably always abundant. No change apparent.

Ecology -

A. Habitat preference: The Kestrel is ubiquitous throughout the region, ranging and nesting from lowland valleys and benchlands to timberline in the Uinta Mountains but only where perching sites are available such as tree

stumps, dead tipped trees, fence posts, power poles or tops of rocks. If there is any one preferred habitat it is the cottonwood groves in the river floodplains. Kestrels feed extensively over the edges of the benchlands adjacent to the river and creek bottomlands. The species nests in woodpecker holes in dead trees, usually but also at cliff sites where there are potholes and ledges. Individuals are commonly seen throughout the Uinta Basin perched atop utility poles and fences.

B. Number of nest site locations:

1 - Southam Canyon R24E T10S Sec. 32, June 5, 1974
2 - White River R24E T10S Sec. 17, June 10, 1974
3 - White River R23E T10S Sec. 8, May 27, 1975
4 - White River at Mt. Fuel bridge R22E T9S, May 30, 1975

C. Food and food relations: Mostly insects such as grasshoppers, but some small birds and mammals. May (1935) says the Kestrel or Sparrow Hawk is one of the most useful of the entire hawk tribe, for its food is very largely composed of injurious insects with a fair proportion of destructive rodents and only a small toll taken from beneficial species of birds. It might well be known as the "grasshopper hawk" because of its fondness for these enemies of agriculture. Species included as important prey items are striped ground squirrels, English or house sparrows, song sparrows, meadow mice and numerous insects. Others include cliff swallows, meadowlarks, Brewer's blackbirds, shrews, beetles, crickets, spiders, lizards and small snakes. Stomach analysis yielded the following results: Total examined 427, mammals in 147, small birds 69, other vertebrates 13, insects 269, empty 29.

Mc Atee (1935) reports grasshoppers and their allies as the chief source of food of the sparrow hawk being found in 491 of 703 stomachs examined. Beetles appeared in 207, caterpillars in 150. Other insects were found in 153 stomachs. Mammals are the most abundant of the vertebrate prey, being found in 192 stomachs. The breakdown is as follows: Meadow mice in 82, white-footed mice 36, house mice 23, pocket mice 3, spermophiles 6, chipmunks 3,

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rabbit 1, wood rat 1, pocket gopher 1, shrews 14, and bat 1. The birds most frequently captured were song sparrows in 13, chipping sparrows 13, warblers 5, meadowlarks 3, ground dove 1, and a quail 1. Lizards were in 41 stomachs, snakes in 21 (garter snakes 10) and frogs in 4 stomachs.

Bent (1938) reports that the food of the sparrow lark includes insects, birds, mammals, reptiles, and amphibians. The diet varies considerably according to season and locality; hence, the birds stomach often indicates merely local or temporary conditions. In the summer grasshoppers make up the bulk of this hawk's food, but with winter many small birds and mammals are taken.

D. Feeding sites and foraging areas in terms of habitat preference: Generally the Kestrel forages widely, but since they are most numerous in river bottomlands, these areas and adjacent benchlands would be favored foraging areas.

E. Food availability: High.

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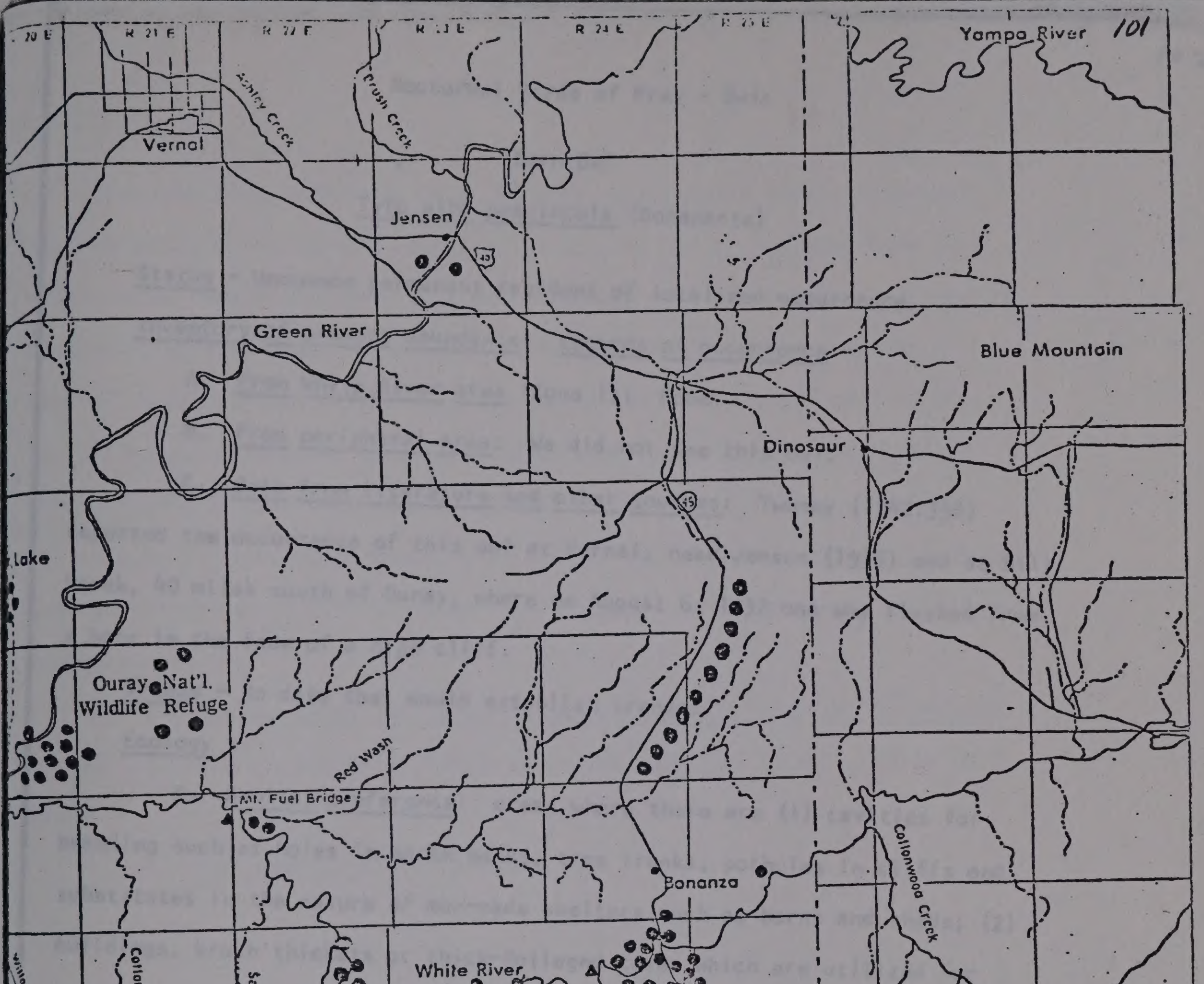
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Ashley Creek
Brush Creek
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Green River
Blue Mountain
Dinosaur
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Lake
Ouray Nat'l.
Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Bonanza
Cottonwood Creek
White River
Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Alchee Wash
Asphalt Wash
Evacuation Creek
Watson
Rainbow
West Fork
Center Fork
Dragon
Burnt Timber Canyon
Sweet Water

16. Map showing locations in the Utah oil shale area where the American Kestrel (Sparrow Hawk) has been observed. Round spots indicate locations where the species was seen; triangles indicate nesting sites.

Nocturnal Birds of Prey - Owls

Barn Owl

Tyto alba pratincola (Bonaparte)

Status - Uncommon permanent resident of localized occurrence.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1): None.

B. From peripheral area: We did not see this owl.

C. Data from literature and other sources: Twomey (1942:398) reported the occurrence of this owl at Vernal, near Jensen (1936) and at Hill Creek, 40 miles south of Ouray, where on August 6, 1937 one was flushed from a hole in the face of a high cliff.

Trends - No data that would establish trends.

Ecology -

A. Habitat preference: areas where there are (1) cavities for breeding such as holes in earth banks, tree trunks, potholes in cliffs and substitutes in the nature of man-made shelters such as barns and sheds; (2) buildings, brush thickets or thick-foilaged trees which are utilized for roosting during the daytime and (3) open hillsides, grassland or agricultural areas where rodents are abundant.

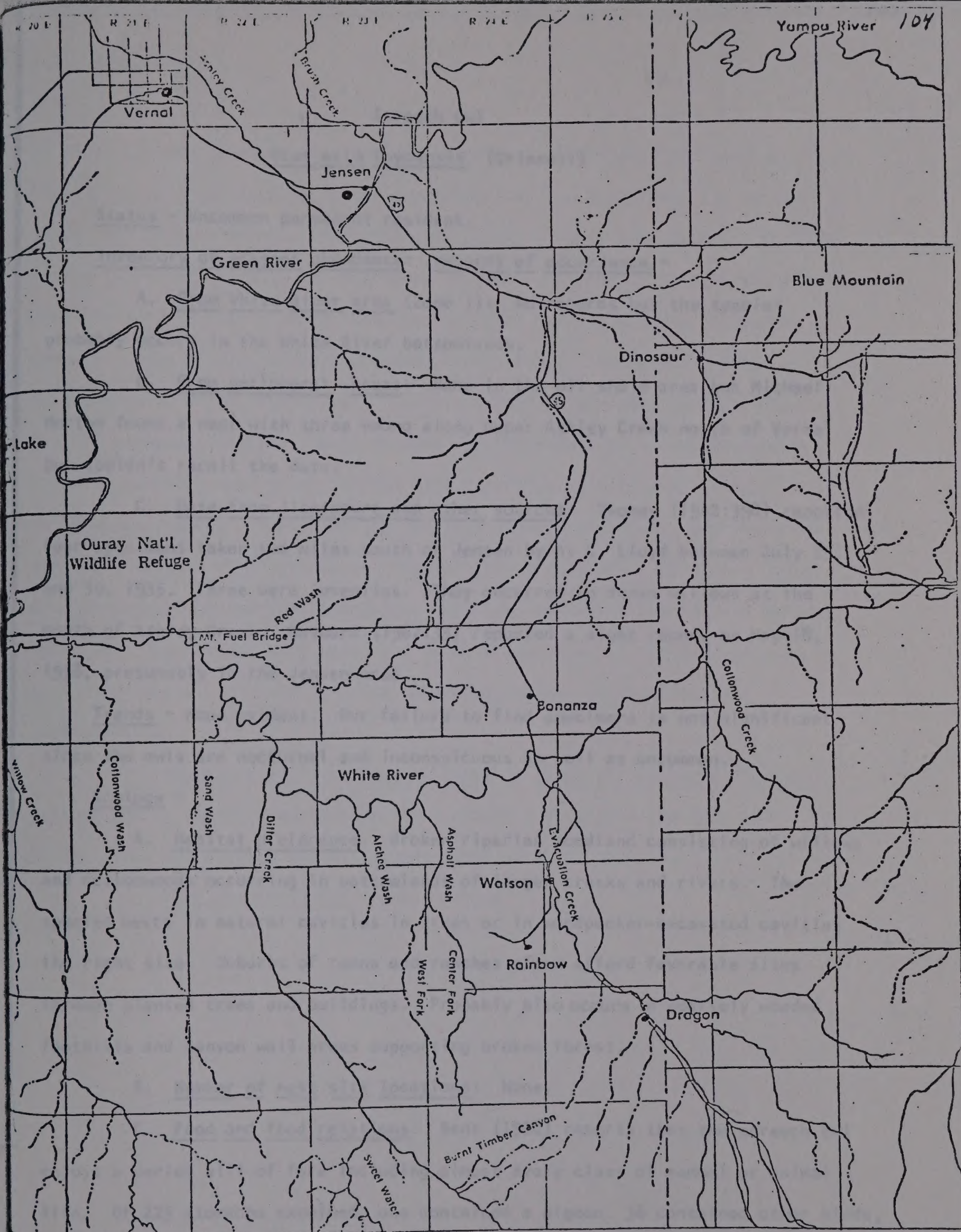
B. Number of nest site locations: None located.

C. Food and food relations: Bent (1938) reports that the barn owl is one of our most useful birds of prey, as its food consists almost entirely of various species of rodents that, from their abundance and destructive habits, are a curse to agriculture and other human interests. In the 39 stomachs examined by A. K. Fisher, one contained a pigeon, three other birds, 17 mice, 17 other mammals, four insects, and seven were empty. In the same study, 200 pellets were examined and the contents were determined as follows: Included were 454 skulls and of these 225 were from meadow

mice, two pine mice, 179 house mice, 20 rats, six jumping mice, 20 shrews, one star-nosed mole, and one vesper sparrow. The following items have been found in the food of the barn owl: various mice and rats representing nearly every available species, pocket gophers, shrews, bats, moles, muskrats, spotted skunk, and young rabbits. Although birds form a small part of their food, a number of species have been found, such as various sparrows, black birds, grackels, starling, cowbird, bobolink, swallows, towhees, flickers, rails, meadow larks, green heron, blue jay. A few insects, such as grasshoppers, beetles, crickets and katydid as well as an occasional frog appear in stomach contents.

D. Feeding sites and foraging areas in terms of habitat preference: No special locations in the oil shale area. The species forages widely at night.

E. Food availability: Moderate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White River
Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
Rainbow
Center Fork
West Fork
Dragon
Burnt Timber Canyon
Sweet Water

17. Map showing locations in the Utah oil shale area where the Barn Owl has been observed

Screech Owl

Otus asio inyoensis (Grinnell)

Status - Uncommon permanent resident.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1): No records but the species probably occurs in the White River bottomlands.

B. From peripheral areas: None in the oil shale area but Michael Horton found a nest with three young along upper Ashley Creek north of Vernal but couldn't recall the date.

C. Data from literature and other sources: Twomey (1942:398) reported four specimens taken two miles south of Jensen by A. C. Lloyd between July 25 and 30, 1935. Three were juveniles. They occurred in dense willows at the mouth of Ashley Creek. Hayward (1967:33) reported a sight record on May 18, 1958, presumably in the Jensen area.

Trends - none evident. Our failure to find specimens is not significant since the owls are nocturnal and inconspicuous as well as uncommon.

Ecology -

A. Habitat preference: Broken riparian woodland consisting of willows and cottonwoods occurring in bottomlands of larger creeks and rivers. The species nests in natural cavities in trees or in woodpecker—excavated cavities the right size. Suburbs of towns and ranches often afford favorable sites through planted trees and buildings. Probably also occurs in sparsely wooded foothills and canyon wall areas supporting broken forest.

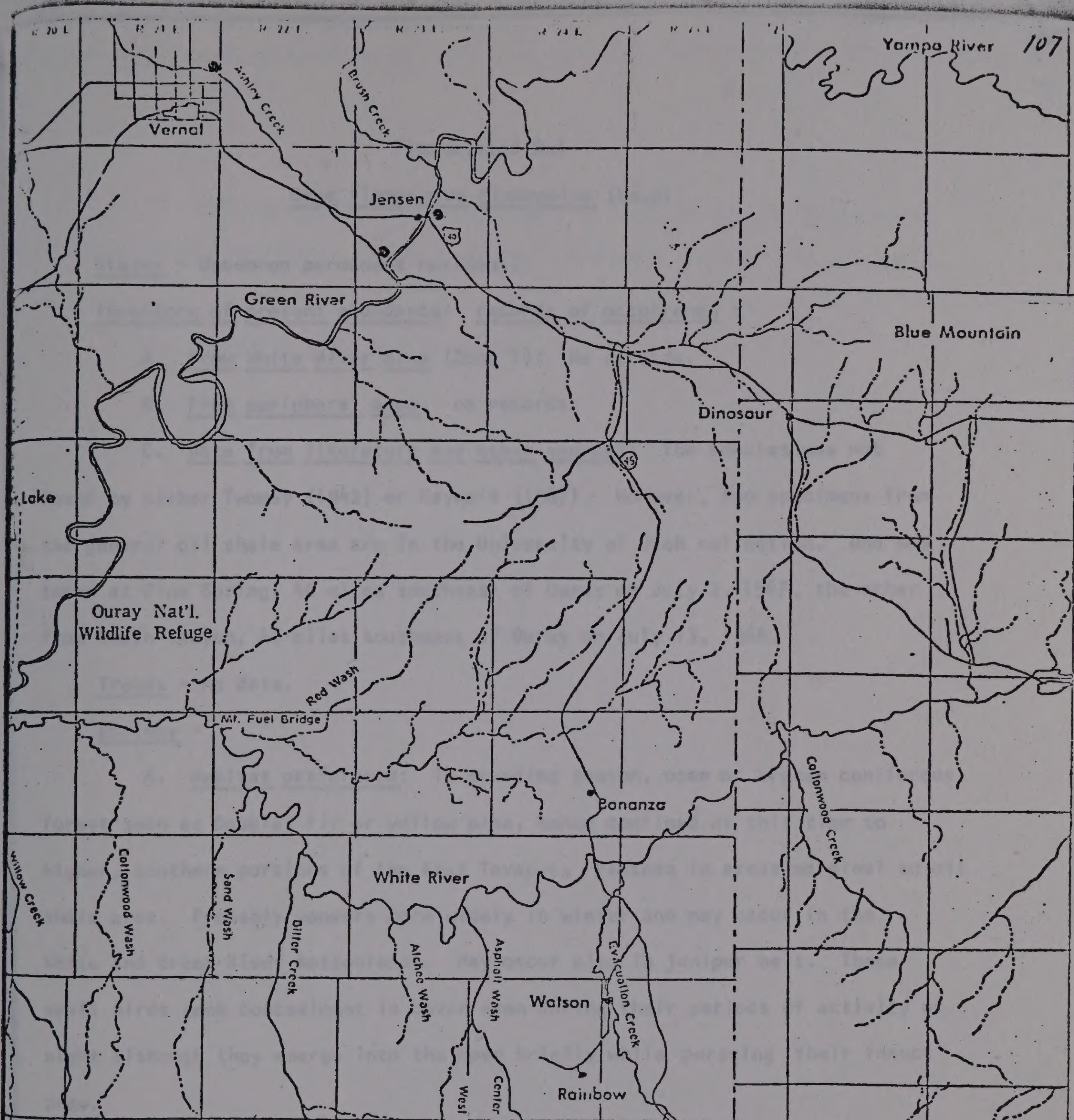
B. Number of nest site locations: None.

C. Food and food relations: Bent (1938) reports that the screech owl enjoys a varied bill of fare including almost every class of mammal or animal life. Of 225 stomachs examined, one contained a pigeon, 38 contained other birds,

91 mice, 11 other mammals', two lizards, four bats, one fish, 100 insects, five spiders, nine crawfish, seven miscellaneous, two scorpions, two earthworms, and 43 were empty. Paul Errington in 1932 reports prey taken as follows: Norway rat 1, meadow mice 49, deer mice 37, shrew 7, English sparrow 36, fish 4, crayfish 3. The list of food items for the barn owl include the following mammals: mice of all varieties, shrews, rats, moles, flying squirrels, chipmunks, and an occasional bat. The birds include pigeons, quail, ruffed grouse, woodcock, sparrow hawk, screech owl (cannibalism), downy woodpecker, kingbird, phoebe, wood pewee, horned lark, starling, blackbirds, orioles, goldfinches, junios, lazuli bunting, English (house) sparrows, cedar waxwings, swallows, tangers, orioles, water thrushes and various other warblers, house wren, chickadee, nuthutches, creepers, catbirds, robins, bluebird, and various sparrows. Insects are also taken and include June beetles, grasshoppers, cutworms, locuts, crickets, cicadas, katydids, moths, caterpillars and hellgramites.

D. Feeding sites and foraging areas in terms of habitat preference: Bottomlands of White, Green and Duchesne rivers and tributaries such as Ashley Creek near Vernal and Hill Creek south of Ouray.

E. Food availability: Probably high.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Mt. Fuel Bridge
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Cottonwood Creek
Willow Creek
Cottonwood Wash
Sand Wash
Ditter Creek
White River
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
Center Fork
West Fork
Rainbow
Dragon
Burnt Timber Canyon
Sweet Water

18. Map showing locations in the Utah oil shale area where the Screech Owl has been observed

Flammulated Owl

Otus flammeolus flammeolus (Kaup)

Status - Uncommon permanent resident.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1): No records.

B. From peripheral area: no records.

C. Data from literature and other sources: The species was not found by either Twomey (1942) or Hayward (1967). However, two specimens from the general oil shale area are in the University of Utah collection. One was taken at Pine Spring, 40 miles southeast of Ouray on July 2, 1967, the other from South Canyon, 46 miles southeast of Ouray on July 13, 1966.

Trends - no data.

Ecology -

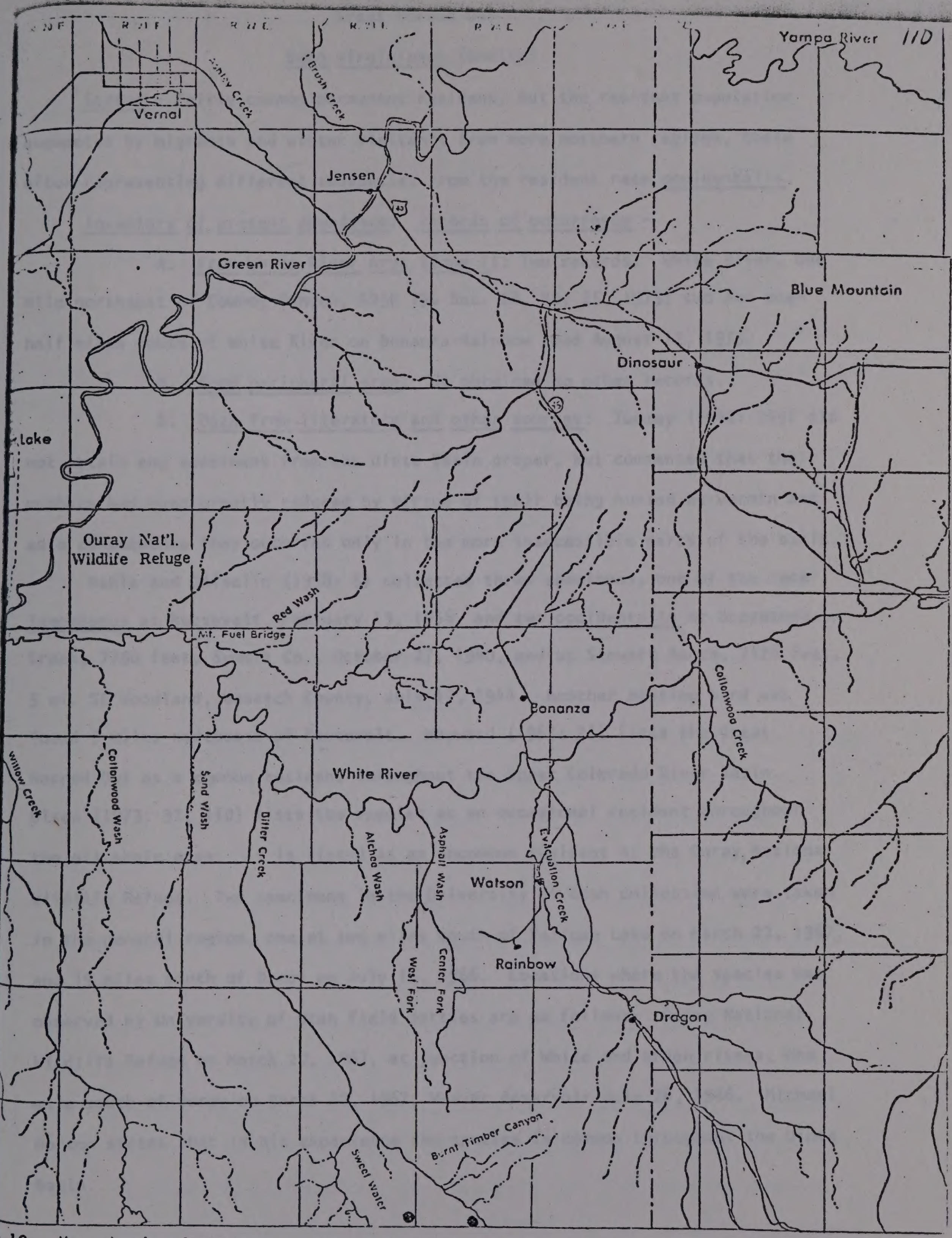
A. Habitat preference: In breeding season, open or broken coniferous forest such as Douglas Fir or yellow pine, hence confined at this time to higher, southern portions of the East Tavaputs Plateau in areas marginal to oil shale area. Probably wanders more widely in winter and may occur in the White and Green River bottomlands. May occur also in juniper belt. These small birds seek concealment in cover even during their periods of activity at night although they emerge into the open briefly while pursuing their insect prey.

B. Number of nest site locations: None.

C. Food and food relations: Bent (1938) says that the flammulated owl is apparently largely, if not wholly, insectivorous, although it may capture a small bird or mammal now and then. In the few stomachs that have been examined various beetles, moths, grasshoppers, crickets, caterpillars, ants, other insects, spiders and scorpions, have been found.

D. Feeding sites and foraging areas in terms of habitat preference: Areas of broken coniferous forest at higher elevations south of the oil shale area.

E. Food availability: Moderate.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Mt. Fuel Bridge
Bonanza
Cottonwood Creek
Willow Creek
Cottonwood Wash
Sand Wash
White River
Bitter Creek
Asphalt Wash
Atchee Wash
Evacuation Creek
Watson
Rainbow
Center Fork
West Fork
Dragon
Burnt Timber Canyon
Sweet Water

e 19. Map showing locations in the Utah oil shale area where the Flammulated Owl has been observed

Great Horned Owl

Bubo virginianus (Gmelin)

Status - Fairly common permanent resident, but the resident population augmented by migrants and winter visitants from more northern regions, these often representing different subspecies from the resident race occidentalis.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Two records: White River, one mile northeast of Cowboy Canyon, R25E T9S Sec. 28, May 25, 1975; two and one-half miles south of White River on Bonanza-Rainbow road August 12, 1975.

B. From peripheral area: We obtained no other records.

C. Data from literature and other sources: Twomey (1942: 399) did not obtain any specimens from the Uinta Basin proper, but commented that their numbers had been greatly reduced by virtue of their being hunted as vermin and as a consequence they occurred only in the more inaccessible parts of the basin.

Behle and Ghiselin (1958: 5) collected three specimens, one of the race lagophonus at Roosevelt, February 13, 1956, and two occidentalis at Soapstone Creek, 7750 feet, Summit Co., October 27, 1940, and at Stewart Ranch, 7128 feet, 5 mi. SE Woodland, Wasatch County, July 17, 1944. Another nesting bird was found 5 miles northeast of Roosevelt. Hayward (1967: 33) lists the Great Horned Owl as a common resident throughout the Upper Colorado River Basin. Olsen (1973: 92, 110) lists the species as an occasional resident throughout the oil shale area. It is listed as an uncommon resident at the Ouray National Wildlife Refuge. Two specimens in the University of Utah collection were taken in the general region, one at two miles south of Pelican Lake on March 22, 1967, and 15 miles south of Ouray on July 15, 1966. Locations where the species was observed by University of Utah field parties are as follows: Ouray National Wildlife Refuge on March 20, 1967, at junction of White and Green rivers, one mile south of Ouray on March 22, 1967; Weaver Reservoir July 28, 1966. Michael Horton states that in his experience the species is common throughout the Uinta Basin.

Trends - Although still common in northeastern Utah their numbers are probably reduced as compared with former times by virtue of indiscriminate shooting and a higher incidence of road kills.

Ecology -

A. Habitat preference: The species occurs in many ecological situations such as rock-walled canyons, riparian bottomlands where the cottonwoods and willows are of large size, juniper-covered benchlands, washes and arroyos. The common feature required is shaded shelter for daytime perching and places for nesting that are out of reach of terrestrial marauders. Nesting sites chosen are niches in cliffs and other birds' nests in trees. The species ranges from the desert and riparian lowlands up to the coniferous forest of the nearby mountains. Michael Horton has found Great Horned Owls nesting in all habitats in the Uinta Basin. One nest of unspecified date was found along the Green River five miles south of Jensen. It was situated in a cottonwood tree.

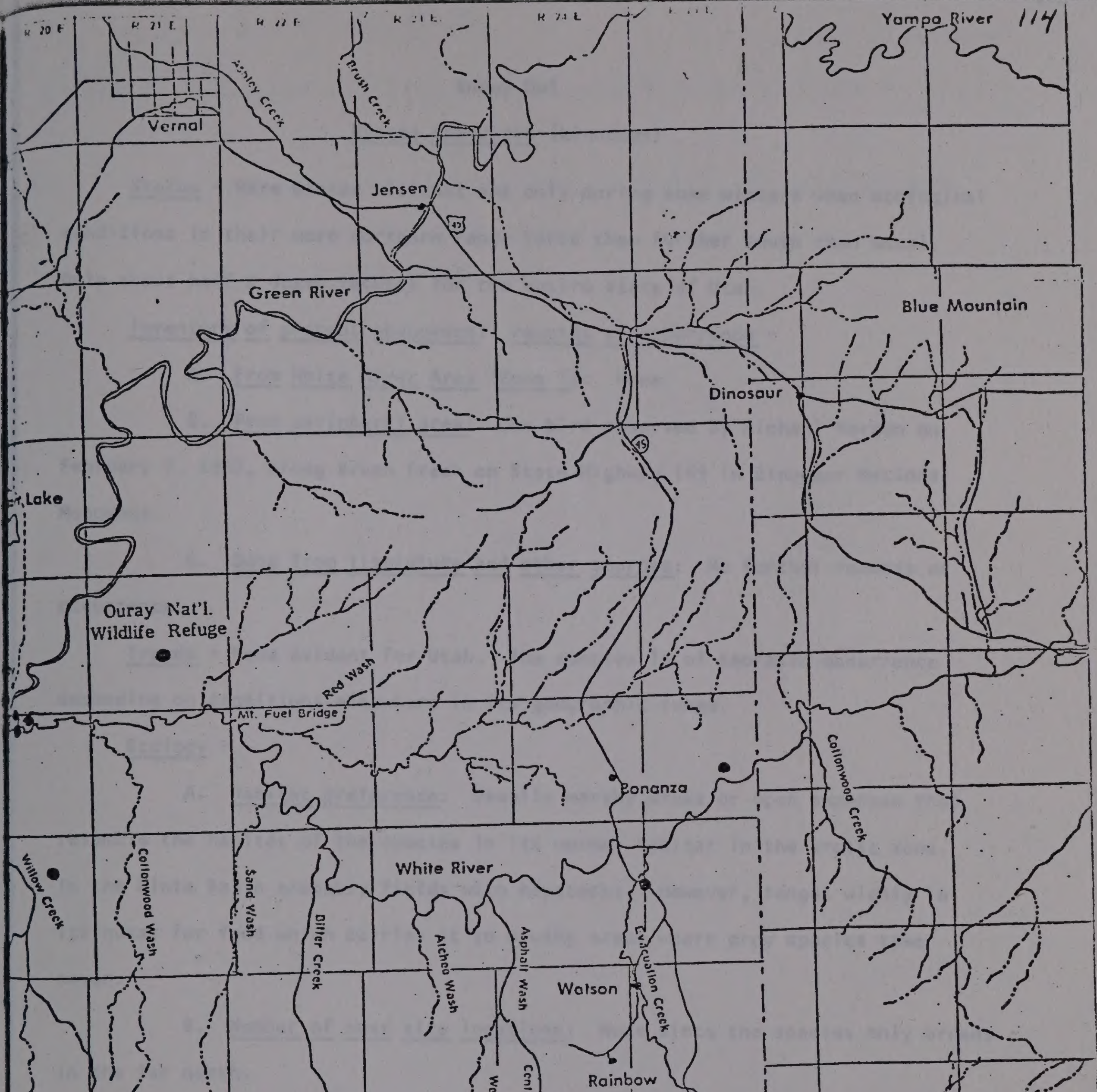
B. Number of nest site locations: None

C. Food and food relations: Bent (1938) says that the Great Horned Owl is a ravenous feeder on a great variety of animal life. Almost any creature that walks, crawls, flies, or swims, except the larger mammals constitute its legitimate prey. It is not particular what it takes as food and will kill whatever is most available and most easily caught. It prefers to feed on smaller mammals, mainly those that are active at night, since these are easier to catch and more readily available in its favorite haunts than are poultry. The list of mammals taken includes hares and rabbits, grey, red, flying and fox squirrels, chipmunks, various rats and mice, including the destructive house species, muskrats, skunks, ground squirrels, pocket gophers, spermophiles, mink, weasels, woodchucks. opossums, porcupines, domestic cats, shrews, and bats. Most records indicate that the cottontail rabbit is the most prominent food item. The list of birds eaten is a very long one and contains many large

species, which are probably attacked under great stress of hunger. Included are pied-billed grebe, several species of wild duck, Canada goose, tame ducks and swans, American bittern, small herons, American coot, Florida gallinule, Virginia rails, red and northern phalarope, Wilson's snipe, yellow-legs, woodcock, various quail and grouse, pheasants, domestic poultry, mourning doves, marsh, Cooper's and red-tailed hawks, barn, barred, long-eared and screech owls, flickers, sapsuckers, and other woodpeckers, crow, starling, jays, blackbirds, meadowlarks, juneos, robins, and various sparrows. The list of miscellaneous food includes snakes, frogs, dace, goldfish, bullheads, crayfish, grasshoppers, katydids, crickets, and scorpions. One item of note is that the horned owl is often known to attack porcupines with adverse results. To illustrate its good points, however, H. A. Surface published the following results of a nest where he found and captured young horned owls. He found a total of 113 Norway rats at the nest within a ten-day period.

D. Feeding sites and foraging areas in terms of habitat preference: No special localities; they forage all through the oil shale area.

E. Food availability: High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Bonanza
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White River
Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
Center Fork
West Fork
Rainbow
Dragon
Burnt Timber Canyon
Sweet Water

e 20. Map showing locations in the Utah oil shale area where the Great Horned Owl has been observed

Snowy Owl

Nyctea scandiaca (Linnaeus)

Status - Rare winter visitant and only during some winters when ecological conditions in their more northern range force them further south than usual. Only about half a dozen records for the entire state of Utah.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): None

B. From peripheral area: One bird observed by Michael Horton on February 7, 1967, along Brush Creek on State Highway 149 in Dinosaur National Monument.

C. Data from literature and other sources: No further records of occurrence.

Trends - None evident for Utah. The species is of sporadic occurrence depending on conditions elsewhere in its geographic range.

Ecology -

A. Habitat preference: Usually marshy areas or open expanses that resemble the habitat of the species in its normal habitat in the arctic zone. In the Uinta Basin probably fields with haystacks. However, ranges widely in its quest for food which carries it to brushy areas where prey species take cover.

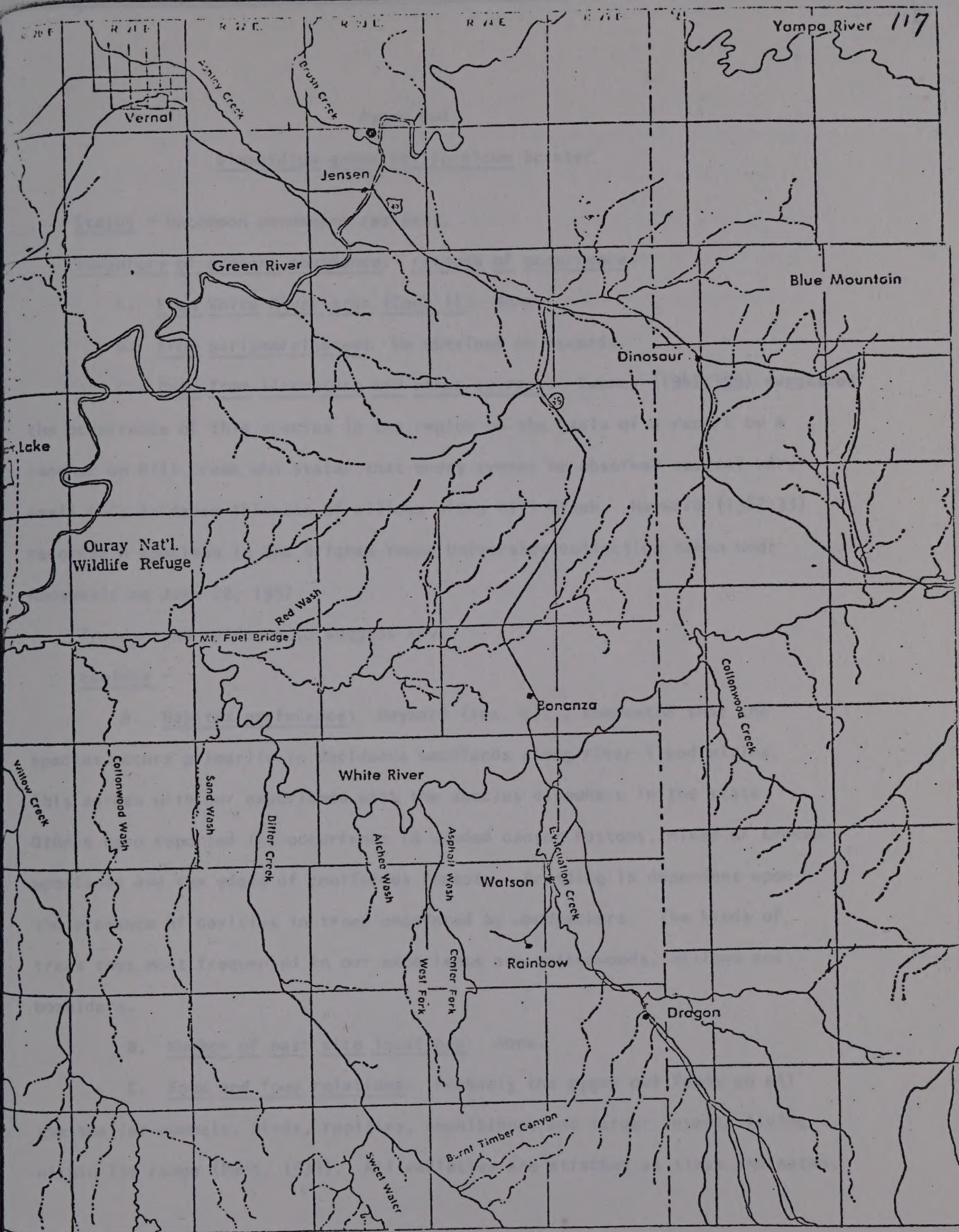
B. Number of nest site locations: None since the species only breeds in the far north.

C. Food and food relations: Nearly all observers agree (Bent 1938) that in its arctic summer home the main food supply of the Snowy Owl consists of lemmings and other small rodents. Besides lemmings and mice, Snowy Owls have been known to kill and eat the following, especially on migration: hares, rabbits, ground squirrels, rats, moles, and shrews. When hard pressed for food, they will take whatever dead animals or birds they find, or will attack animals caught in traps. The birds taken usually are ptarmigan which are used to feed

the young. If mice and other rodents are not plentiful, they will turn to more birds in lieu of scarce mammals.

D. Feeding sites and foraging areas in terms of habitat preference: Open fields, areas of haystacks, clumps of brush.

E. Food availability: Moderate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Sand Wash
Diller Creek
Atchee Wash
Asphalt Wash
Watson
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Rainbow
West Fork
Center Fork
Dragon
Burnt Timber Canyon
Sweet Water

e 21. Map showing the location in the Utah oil shale area where the Snowy Owl has been observed

Pygmy Owl

Glaucidium gnoma californicum Sclater

Status - Uncommon permanent resident.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1): None.

B. From peripheral area: We obtained no records.

C. Data from literature and other sources: Twomey (1942:399) suggested the occurrence of this species in the region on the basis of a report by a rancher on Hill Creek who stated that every summer he observed several very small owls in dense thickets of willows along Hill Creek. Hayward (1967:33) recorded a specimen in the Brigham Young University collection taken near Roosevelt on June 22, 1957.

Trends - No evidence to suggest any.

Ecology -

A. Habitat preference: Hayward (loc. cit.) commented that the species occurs primarily in deciduous woodlands along river flood plains. This agrees with our experience with the species elsewhere in the state. Others have reported its occurrence in wooded canyon bottoms, mixed or broken woodlands and the edges of coniferous forests. Breeding is dependent upon the presence of cavities in trees excavated by woodpeckers. The kinds of trees thus most frequented in our experience are cottonwoods, willows and boxelders.

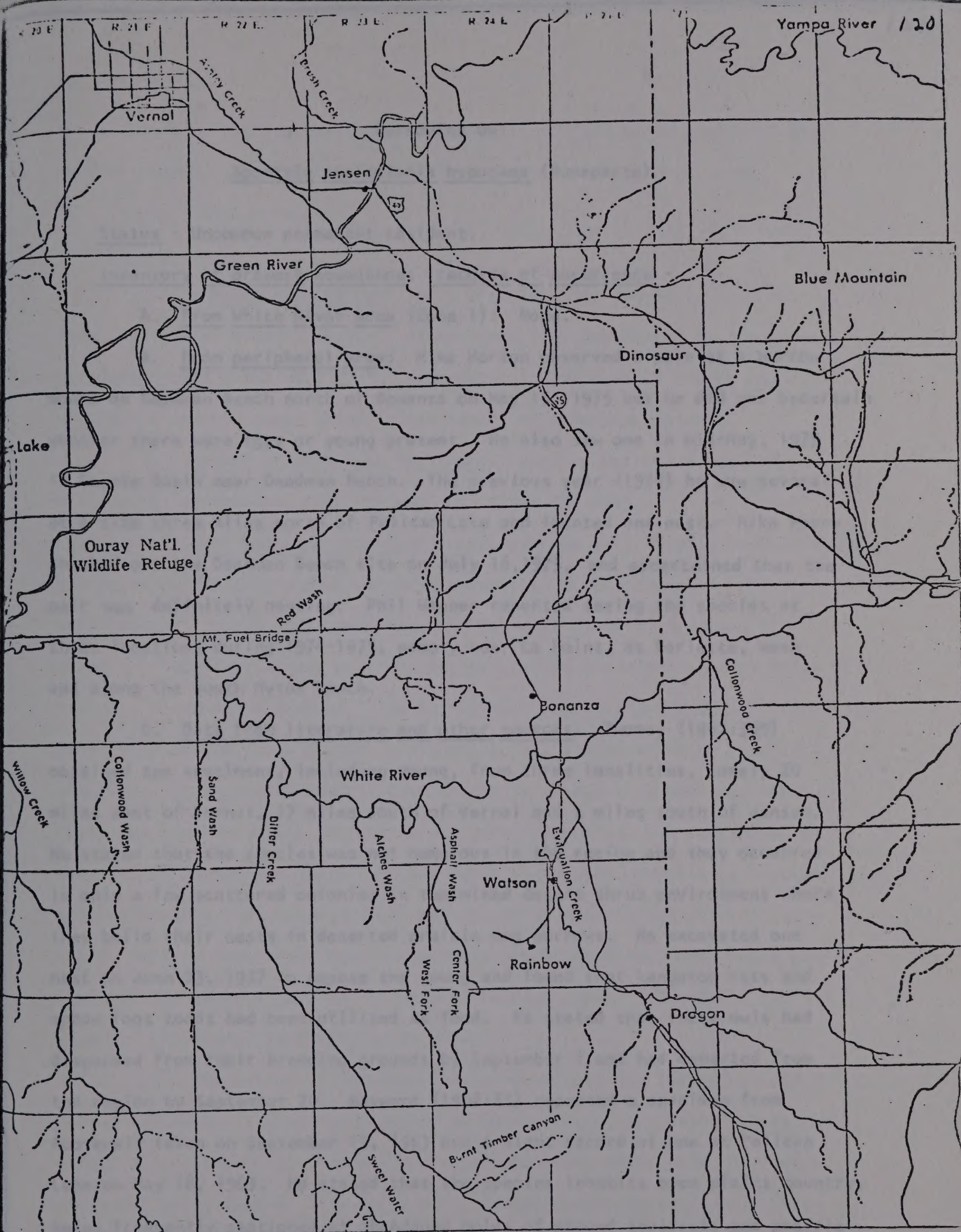
B. Number of nest site locations: None.

C. Food and food relations: Probably the pygmy owl feeds on all the smaller mammals, birds, reptiles, amphibians, and larger insects living within its range (Bent, 1938). All varieties are attacked at times and eaten.

Still it is quite likely that mice and large insects are more often eaten than any other items. Aside from the variety of its food, the most astonishing thing about its diet is the comparatively large size of some of its captives, both mammalian and avian. It is in part a diurnal bird of prey and its victims reflect this fact. It occasionally lives on grasshoppers and other insects, only when small mammals are not available. Meadow mice, deer mice, shrews, house mice, various sparrows (especially house) seem to be the bill of fare for this owl. Also utilized as prey species are grasshoppers, quail, lizards, robins, ground squirrels, beetles, toads, frogs and small snakes.

D. Feeding sites and foraging areas in terms of habitat preference: River bottomlands, especially groves of cottonwoods.

E. Food availability: Moderate.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Asphalt Wash
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Rainbow
West Fork
Center Fork
Dragon
Burnt Timber Canyon
Sweet Water

e 22. Map showing the location in the Utah oil shale area where the Pygmy Owl has been observed

Burrowing Owl

Speotyto cunicularia hypugaea (Bonaparte)

Status - Uncommon permanent resident.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1): None.

B. From peripheral area: Mike Horton observed a pair at a burrow mound on Deadman Bench north of Bonanza on May 15, 1975 but he did not ascertain whether there were eggs or young present. He also saw one in mid-May, 1975 in Coyote Basin near Deadman Bench. The previous year (1974) he saw several at a site three miles north of Pelican Lake and located one nest. Mike Perry checked out the Deadman Bench site on July 16,1975, and ascertained that the pair was definitely nesting. Phil Wagner reported seeing the species at three locations during 1974-1975, namely near La Point, at Pariette, Wash and along the south Myton Bench.

C. Data from literature and other sources: Twomey (1942:399) obtained ten specimens, including young, from three localities, namely 20 miles east of Vernal, 17 miles south of Vernal and 2 miles south of Jensen. He stated that the species was not numerous in the region and they occurred in only a few scattered colonies in the mixed desert shrub environment where they build their nests in deserted prairie dog burrows. He excavated one nest on June 23, 1937 to expose the young and found that kangaroo rats and spade foot toads had been utilized as food. He stated that these owls had dispersed from their breeding grounds by September 1 and had departed from the region by September 20. Hayward (1967:33) reported a specimen from Roosevelt taken on September 19, 1953 and a sight record of one at Pelican Lake on May 18, 1963. He stated that the species inhabits open plains country, being frequently stationed at abandoned holes of ground squirrels and prairie

dogs. There is one specimen in the University of Utah collection from the general region, taken at Arcadia, Duchesne County on October 3, 1971.

Trends - None evident.

Ecology -

A. Habitat preference: Open, dry, level or nearly level grassland, prairie or desert terrain. Since there is a dependence on the larger burrowing mammals for nest sites, they occur in areas where ground squirrel or prairie mammals occur which is indicative of abandoned burrows.

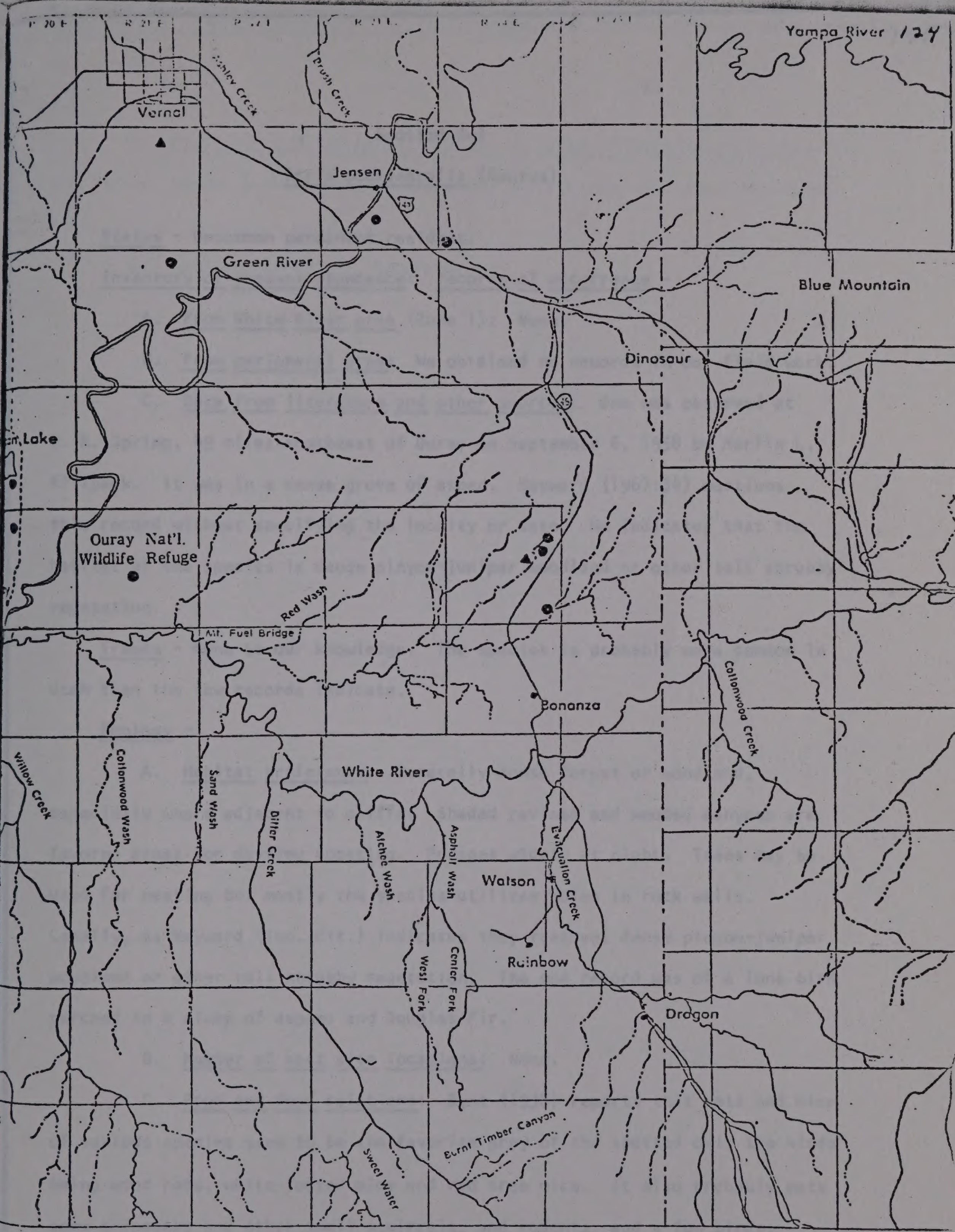
B. Number of nest site locations: One, on Deadman Bench, seven miles north of Bonanza, R24E T4S Sec. 17 on May 15, 1975.

C. Food and food relations: According to Bent (1938), the burrowing owl is unquestionably one of our most beneficial birds of prey. It destroys very few small birds, and when these are taken it is mainly to feed its young. It subsists almost entirely on insects and injurious rodents which it destroys in enormous numbers. Its insect food includes grasshoppers, locusts, beetles, crickets, caterpillers, dragonflies and others which it catches on the wing. A. K. Fisher reports that in the 32 stomachs he examined, three contained small mammals, three lizards, three scorpions, one centipede, 30 insects, while one was empty. In his table of stomach contents he records seven stomaches that contained between 40 and 50 locusts and other insects each. Next in importance come the mammals including mice, rats, and ground squirrels of various species, young prairie dogs, young cottontails, pocket gophers, chipmunks, shrews and even bats.

One burrow in Washington state contained the following: 25 mice, three sage rats, 12 ground squirrels, 10 horned larks, one Bell's vireo and three various sparrows. Various miscellaneous items enter into the food of burrowing owls, such as lizards, snakes, frogs, toads, salamanders, fishes, scorpions, centipedes and myriapods.

D. Feeding sites and foraging areas in terms of habitat preference: The immediate vicinity of the nest, thus in the oil shale area in Deadman Bench north of Bonanza and a site north of Pelican Lake in the Ouray area.

E. Food availability: Moderate.


Yampa River
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Ashley Creek
Brush Creek
Jensen
Green River
Blue Mountain
Dinosaur
Lake
Ouray Nat'l.
Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Bonanza
Cottonwood Creek
White River
Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
Center Fork
West Fork
Rainbow
Dragon
Burnt Timber Canyon
Sweet Water

e 23. Map showing the locations in the Utah oil shale area where the Burrowing Owl has been observed. Round spots indicate locations where the species was seen; triangle indicates a nesting site.

Spotted Owl

Strix occidentalis (Xantus)

Status - Uncommon permanent resident.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1): None.

B. From peripheral area: We obtained no records in our field work.

C. Data from literature and other sources: One was observed at P. R. Spring, 49 miles southeast of Ouray on September 6, 1958 by Merlin L. Killpack. It was in a dense grove of aspen. Hayward (1967:34) mentions this record without specifying the locaity or date. He indicates that the habitat of the species is dense pinyon-juniper woodland or other tall shrubby vegetation.

Trends - None to our knowledge. The species is probably more common in Utah than the few records indicate.

Ecology -

A. Habitat preference: Generally dense forest or woodland, especially where adjacent to cliffs. Shaded ravines and wooded canyons are favored areas for daytime roosting. Forages widely at night. Trees may be used for nesting but mostly the species utilizes holes in rock walls. Locally, as Hayward (loc. cit.) indicates they frequent dense pinyon-juniper woodland or other tall shrubby vegetation. The one record was of a lone bird perched in a clump of aspens and Douglas Fir.

B. Number of nest site locations: None.

C. Food and food relations: Bent (1938) reports that rats and mice of various species seem to be the favorite prey of the spotted owl, the kinds being wood rats, white-footed mice and red tree mice. It also probably eats some chipmunks and other small squirrels, and rodents, and a few birds.

D. Feeding sites and foraging areas in terms of habitat preference: Steep sided, wooded canyons such as along the White River; elsewhere copses of trees. Forage widely at night.

E. Food availability: Moderate.

Long-Eared Owl

Asia wilsonianus (Lesson)

Status - Uncommon resident.

Inventory of present abundance: records of occurrence -

A. *From White River area* (Zone 1): Two records: Two birds at Bitter Creek Corral, R22E T11S Sec. 26, September 14, 1974; two adults, White River at Cowboy Canyon, R25E T9S Sec. 27 (nest with three young) June 9-10, 1975.

B. *From peripheral area*: In our field work we did not obtain additional records. Michael Horton reported an active nest in May, 1974 at the south end of Stewart Lake. It was situated midway up in a dead tree. The same nest was occupied in May, 1975 and had young in the nest. In 1973 he saw numerous Long-eared Owls along Ashley Creek northeast of Vernal but none then in 1974 or 1975.

C. *Data from literature and other sources*: Twomey (1942:400) did not see any of these owls in his field work in the region in 1937 but he reported that A. C. Lloyd collected two males and two females near Jensen on April 24 and May 15, 1935. Behle and Ghiselin (1958:5) reported a specimen taken three miles south of Vernal on June 20, 1949.

Hayward (1967:34) says of the Long-eared Owl: "Numerous records indicate the Long-eared Owl is rather common in suitable habitats everywhere within the upper basin. They inhabit dense growths of woodlands along the stream and are also frequently found in pinyon-juniper and oak thickets where they occupy the abandoned nests of magpies ...".

Trends - None apparent.

Ecology -

A. *Habitat preference*: This species typically occurs in river or creek

bottomlands where there are cottonwoods and willows, but also may be found in in drier terrain such as stands of pinyon-junipers. From their diurnal, concealed roosting sites, they forage widely at night, not only along the riparian areas but also out over open terrain adjacent to the woodland areas, seeking their prey species of rodents, principally mice. The two seen at the Bitter Creek corral, which is about seven miles south of the White River bottomlands, were in a flat, desert scrub consisting of greasewood and shadscale. The one next discovered was located in a cottonwood about 40 feet above ground and two feet below the top. The owls seemingly had utilized an abandoned Cooper's Hawk's nest.

B. Number of nest site locations: one, near the junction of Cowboy Canyon and the White River, R25E T9S Sec. 27. It was visited on June 5, 1975 and contained three young.

C. Food and food relations: Twomey (1942:400) noted that one of the stomachs of the birds taken by A. C. Lloyd, a female taken on April 24, 1935, contained the remains of a kangaroo rat which indicates foraging out over the shrub desert.

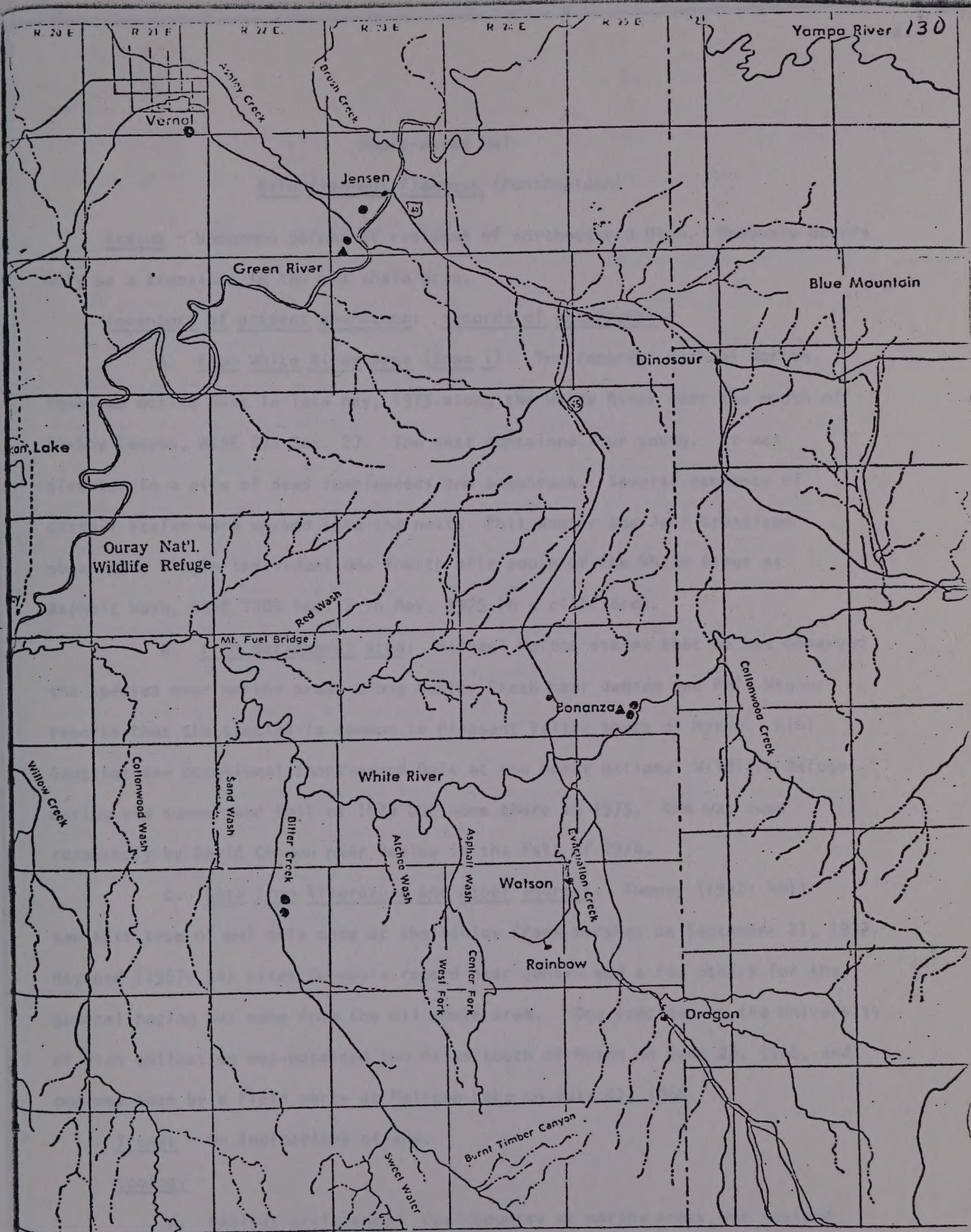
Bent (1938) comments that unquestionably the Long-eared Owl is one of our most beneficial birds of prey, since a very large proportion of its food (probably close to 80 or 90% on a seasonal average) consists of injurious rodents. A. K. Fisher's stomach content analysis reveals that out of 107 stomachs examined one contained a game bird (Valley Quail), 15 other birds, 84 contained mice, five other mammals, one insects, while 15 were empty. Quoting another source, Bent said that 176 skulls were found below a roost and only 13 were those of birds. B. H. Warren reports 22 out of 23 Long-eared Owl's stomachs examined contained nothing but mice.

Bent further summarizes that of a total of 3,273 items retrieved from pellets and stomachs of this species, 2,732 were remnants of meadow mice, 497

were deer mice, 14 were shrews, three Norway rat, one juvenile cottontail and birds 26. A listing by species taken is as follows: Mammals were Norway rat, shrews, moles, squirrels, chipmunks, podeet gophers, bats and young rabbits. The birds most often taken are various species of sparrows, red-winged blackbirds, horned larks, meadow lark, towhees, junios, goldfinches, warblers, kinglets, thrushes and tanagers. Beetles and various insects, frogs and an occasional small snake have been eaten by this owl. The list of birds, although long in aggregate, makes up but a small portion of this owl's diet.

D. Feeding sites and foraging areas in terms of habitat preference: No special areas. They cruise widely in the vicinity of nesting and roosting areas.

E. Food availability: Moderate.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Yampa River
Ashley Creek
Brush Creek
Vernal
Jensen
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Green River
Blue Mountain
Dinosaur
45
Lake
Ouray Nat'l. Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Cottonwood Creek
Bonanza
White River
Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Atchee Wash
Asphalt Wash
Watson
Evacuation Creek
West Fork
Center Fork
Rainbow
Dragon
Burnt Timber Canyon
Sweet Water

24. Map showing the locations in the Utah oil shale area where the Long-eared Owl has been observed. Round spots indicate locations where the species was seen; triangles indicate nesting sites.

Short-eared Owl

Asio flammeus flammeus (Pontoppidan)

Status - Uncommon permanent resident of northeastern Utah. Probably occurs only as a transient in the oil shale area.

Inventory of present abundance: records of occurrence -

A. From White River Area (Zone 1): Two records: Michael Horton found an active nest in late May, 1973 along the White River near the mouth of Cowboy Canyon, R25E T9S Sec. 27. The nest contained four young. It was situated in a pile of dead tumbleweeds and sagebrush. Several remnants of cattail stalks were worked into the nest. Phil Wagner and Jeff Grandison observed a single individual one fourth mile south of the White River at Asphalt Wash, R24E T10S Sec. 7 in May, 1975 in a cliff area.

B. From peripheral area: Michael Horton states that he has observed the species near marshy areas along Ashley Creek near Jensen and Phil Wagner reports that the species is common in Pleasant Valley south of Myton. Mimi Sangster saw occasional Short-eared Owls at the Ouray National Wildlife Refuge during the summer and fall of 1974 but none there in 1975. One was seen repeatedly by David Condon near Naples in the fall of 1974.

C. Data from literature and other sources: Twomey (1942: 401) saw this type of owl only once at the Ashley Creek marshes on September 21, 1937. Hayward (1967: 34) cites Twomey's record near Jensen and a few others for the general region but none from the oil shale area. One specimen in the University of Utah collection was obtained two miles south of Myton on June 20, 1966, and one was seen by a field party at Pelican Lake on July 22, 1966.

Trends - No indications of any.

Ecology -

A. Habitat preference: Open country at marshy areas, wet lowland meadows, and alfalfa fields in irrigated country. Nests in tule patches or tall grass in damp situations and generally uses this type of habitat for daytime

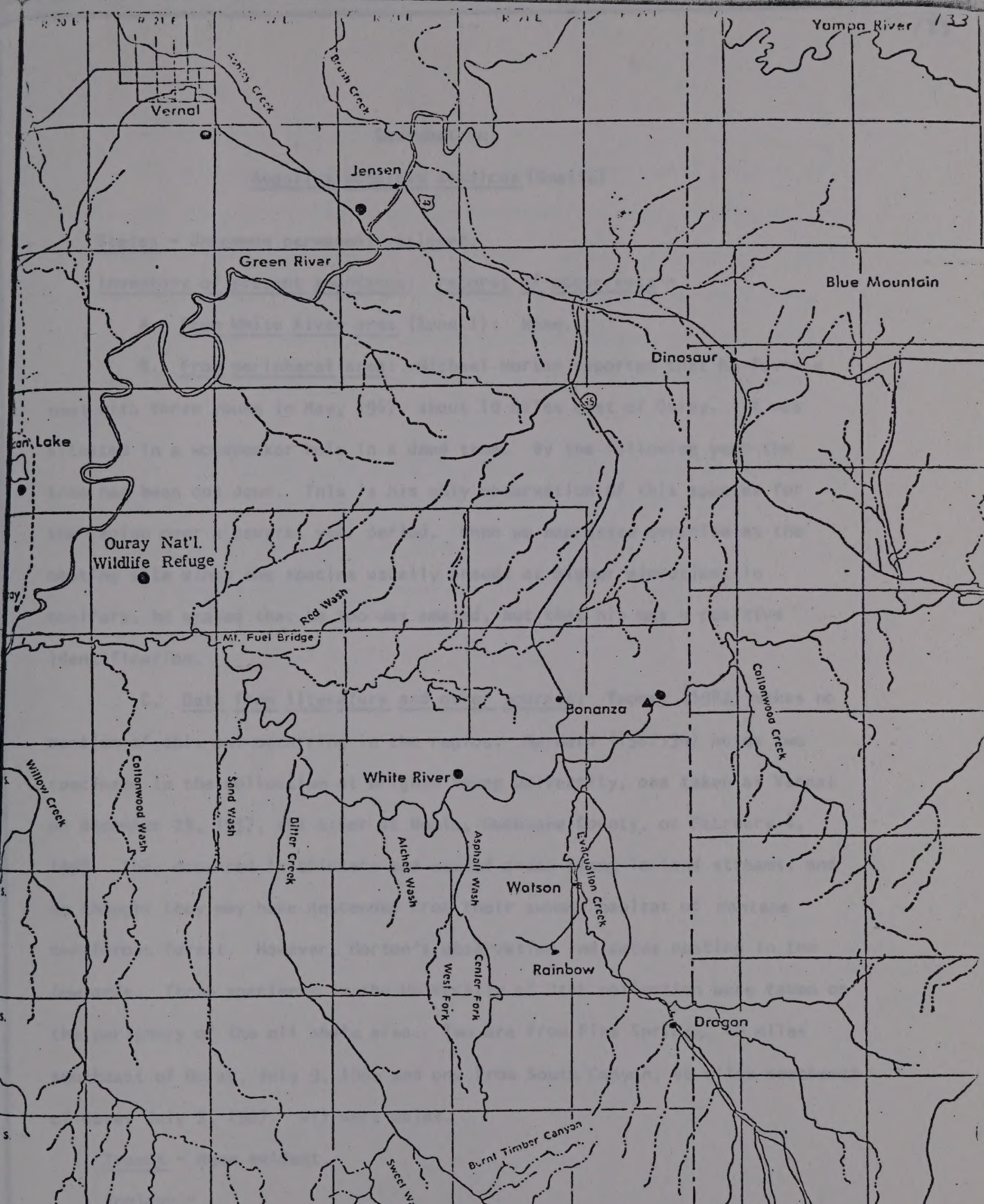
roosting, but forages widely out over dry prairie country. This is the most diurnal of the owls and is occasionally seen abroad during the day.

B. Number of nest site locations: None.

C. Food and food relations: Bent (1938) reports rodents of various kinds eaten, particularly meadow or field mice. A. K. Fisher's analysis of stomach contents revealed the following: Total examined 101: 1 contained a small bird, 77 mice, 7 other mammals, 7 insects, and 14 were empty. The species list consisted of meadow mice, white-footed mice, shrews, cotton rat, rabbit, pocket gopher, and a mole. The grackle, red-winged blackbird, juncos, various sparrows and one robin made up the birds. Junius Henderson in 1927 reported that 75% of the food of this owl consists of mice. It occasionally eats insects with one stomach containing over 50 grasshoppers. Cahn and Kemp's report of 1930 on 254 stomachs that they examined revealed that 15% contained birds, and there were 137 small mammals. Errington in 1932 from a study of pellets found 68 meadow mice, 115 deer mice, 1 snow bunting, and 1 meadowlark.

D. Feeding sites and foraging areas in terms of habitat preference: None in Zone 1 but in the peripheral area at the Ashley marshes and Stewart Lake near Jensen and the Ouray National Wildlife Refuge.

E. Food availability: High in appropriate areas.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Blue Mountain
Dinosaur
Lake
Ouray Nat'l. Wildlife Refuge
Red Wash
Mt. Fuel Bridge
Bonanza
Cottonwood Creek
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Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
Rainbow
Center Fork
West Fork
Dragon
Burnt Timber Canyon
Sweet Water

ure 25. Map showing the locations in the Utah oil shale area where the Short-eared Owl has been observed. Round spots indicate locations where the species was seen; triangle indicates a nesting site.

Saw-whet Owl

Aegolius acadicus acadicus (Gmelin)

Status - Uncommon permanent resident.

Inventory of present abundance: records of occurrence -

A. From White River area (Zone 1): None.

B. From peripheral area: Michael Horton reported that he found a nest with three young in May, 1967, about 10 miles east of Ouray. It was situated in a woodpecker hole in a dead tree. By the following year the tree had been cut down. This is his only observation of this species for the region over a several year period. When we expressed surprise at the nesting site since the species usually breeds at higher elevations in conifers, he stated that he too was amazed, but that his was a positive identification.

C. Data from literature and other sources: Twomey (1942) makes no mention of this owl occurring in the region. Hayward (1967:34) notes two specimens in the collection at Brigham Young University, one taken at Vernal on December 29, 1957, the other at Neola, Duchesne County, on February 4, 1959. They occurred in thickets and wooded areas along lowland streams, and he thought they may have descended from their summer habitat of montane coniferous forest. However, Horton's observation indicates nesting in the lowlands. Three specimens in the University of Utah collection were taken on the periphery of the oil shale area. Two are from Pine Springs, 40 miles southeast of Ouray, July 9, 1966 and one from South Canyon, 46 miles southeast of Ouray July 2, 1967. All were males.

Trends - None evident.

Ecology -

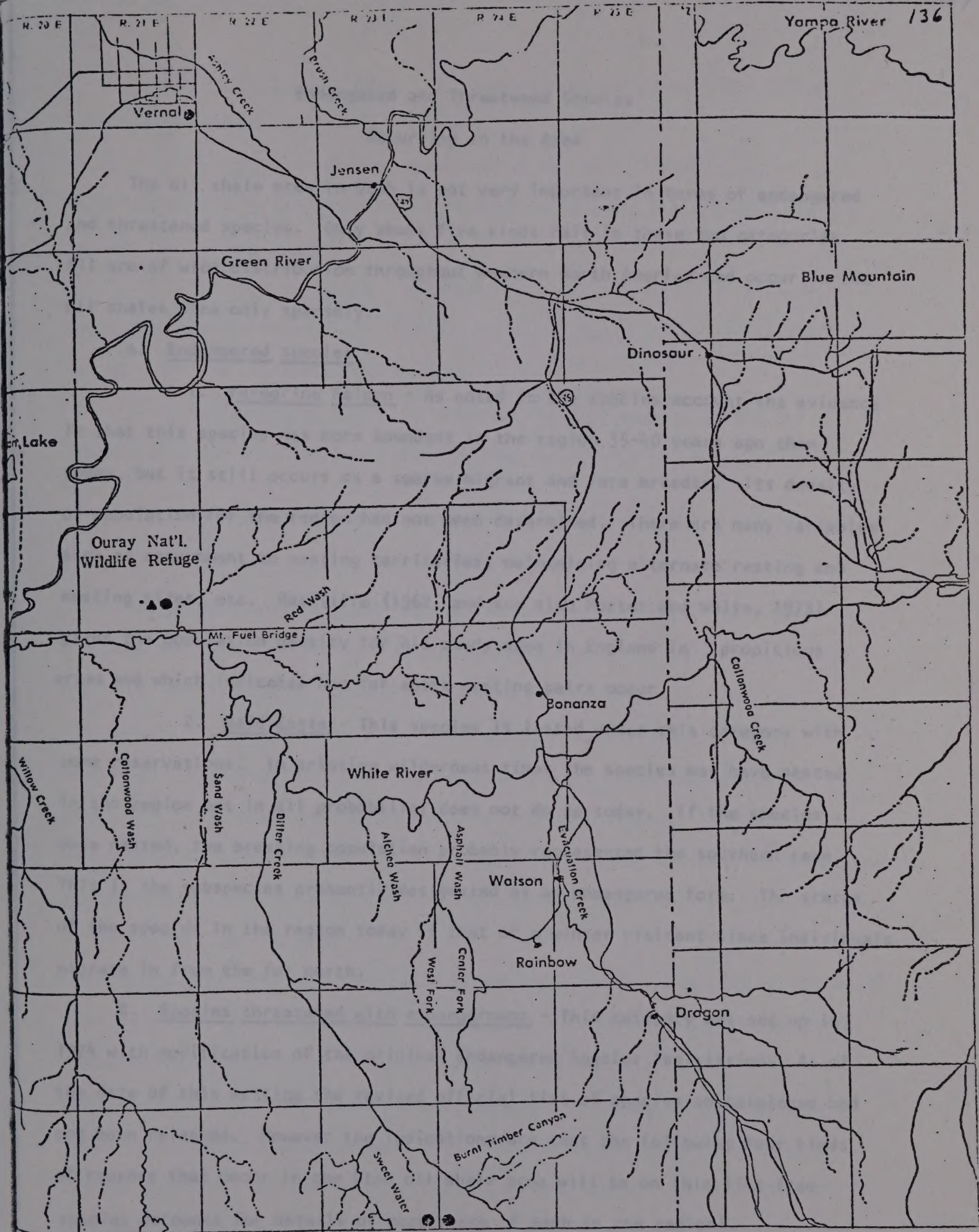
A. Habitat preference: Usually in woodland areas or broken forest land, upon occasion in brushland.

B. Number of nest site locations: None.

C. Food and food relations: Bent (1938) reports that the food of the Saw-whet Owl consists mainly of mice (especially woodland mice), small rats, young red and flying squirrels, chipmunks, shrews, bats and other small mammals. A few small birds, such as sparrows, juncos, and warblers were eaten. A. K. Fisher reports the following stomach analysis results. Total examined 22; 17 contained mice, one a bird, one an insect, and three were empty.

D. Feeding sites and foraging areas in terms of habitat preference: No special areas. Potentially all along the White and Green Rivers and up into the brushy and forested areas throughout the region.

E. Food availability: Moderate.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Yampa River
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Green River
Blue Mountain
Dinosaur
Lake
Ouray Nat'l.
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Red Wash
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Cottonwood Creek
White River
Willow Creek
Cottonwood Wash
Sand Wash
Bitter Creek
Atchee Wash
Asphalt Wash
Evacuation Creek
Watson
West Fork
Center Fork
Rainbow
Dragon
Burnt Timber Canyon
Sweet Water

26. Map showing the locations in the Utah oil shale area where the Saw-whet Owl has been observed. Round spots indicate locations where the species was seen; triangle indicates a nesting site.

Endangered and Threatened Species
Occurring in the Area

The oil shale area in Utah is not very important in terms of endangered and threatened species. Only about five kinds fall in these two categories. All are of wide distribution throughout western North America and occur in the oil shales area only sparsely.

A. Endangered species -

1. Peregrine Falcon - As noted in the species account the evidence is that this species was more abundant in the region 35-40 years ago than today, but it still occurs as a sparse migrant and rare breeder. Its density of population for the region has not been determined. There are many variables such as attachment to nesting territories, maintaining alternate resting and nesting sites, etc. Ratcliffe (1962, and see also Porter and White, 1973) gives the population density for his study area in England in propitious areas and which indicates how far apart nesting pairs occur.

2. Bald Eagle - This species is listed under this category with some reservations. In pristine wilderness times the species may have nested in the region but in all probability does not do so today. If the species once nested, the breeding population probably represented the southern race. This is the subspecies presently designated as an endangered form. The status of the species in the region today is that of a winter visitant since individuals migrate in from the far north.

B. Species threatened with endangerment - This category was set up in 1974 with modification of the original Endangered Species legislation. As of the date of this writing the revised official list of species so cataloged had not been released. However the indications are that the following four kinds of raptors that occur in the Utah oil shale area will be on this list (see species accounts for details of occurrence of each in the region).

1. Ferruginous Hawk - A sparse summer resident in the region and casual visitant to the oil shale area.

2. Osprey - Also a sparse summer resident in the region, occurring mostly to the north in the Flaming Gorge area, but a casual migrant through the oil shale area.

3. Prairie Falcon - An uncommon summer resident with a few eyries known from the oil shale area. This is the most important species in this category for the oil shale area in Utah.

4. Burrowing Owl - An uncommon resident species with a few records of occurrence and nest sites discovered, mostly in peripheral areas.

Impact of Development of Oil Shale Resources on Raptors

The extraction of kerogen from the oil shales will create serious environmental side effects such as disruption of some land, a decrease in air quality, destruction of vegetation, lowered water tables and a decrease in the quality of surface water in a region already improverished in water resources. Hordes of people will be attracted to the area and many will inhabit this presently remote and sparsely populated region. There will undoubtedly be adverse effects on the raptors of the environmental perturbations and the human disturbance factor. We envision that the impact on raptors will be both direct and indirect.

A. Direct effects - There will probably be an increased rate of mortality from such factors as road kills, shooting and interference with nests causing exposure and perhaps death of young. With the present remoteness of the region and low density of human population, disturbance by humans is at a very low level. Ironically the disturbance by humans has already started by virtue of the activities of various research teams studying raptors. In addition to our study commissioned by contract No. 74 2753 we have become aware of a

similar study being conducted by personnel of the Division of Wildlife Resources apparently under contact with or at least supported by V.T.N. which in turn is receiving funds from the oil companies that hold the leases to the federal oil shale lands in Utah. The personnel involved in this duplicate study did not seem to know of our study. We happened to meet in the field. As a consequence there was no attempt initially to coordinate efforts. We hear rumors that yet another group from Utah State University has been contacted by V.T.N. and presumably are to launch yet another study. We take a dim view of the utilization of helicopters making repeated visits to eyrie sites, especially early in the season when there may be eggs or small young present and when the likelihood of desertion by adults is enhanced. Incidentally a recent article by White and Sherrod (1973) weighs the advantages and disadvantages of the use of rotor-winged aircraft in raptor surveys and Fyfe and Olendorf (1975) have warned of certain dangers in investigative procedures.

B. Indirect effects - These will arise from disruption of habitat and food, depending on the attributes of the several species. They will probably not be very evident, but in the long run will probably constitute a more serious threat to the birds of prey than the direct effects. Some of the developments that may be expected are as follows.

In connection with impoundment of water along the White River there will be inundation of riparian growths of cottonwoods, willows and tamarix. This will constitute habitat destruction for tree nesting forms such as Cooper's Hawks, Red-tailed Hawks and Great Horned Owls. This may not be as serious as would seem at first glance, for some species, at least, such as the Great Horned Owl will be able to adjust by utilizing alternate cliff-nesting sites, but the overall effect will probably be a lowering of the density of the raptors in the region.

Two species may even be benefited by the changes, namely the Turkey Vulture and Osprey. Vultures are carrion eaters and so might be expected to have more than the normal amount of food in the nature of carcasses from people shooting rodents and lagomorphs and from road kills. Conceivably a reservoir would eventually become stocked with fish which would attract the Osprey, a fish-eating hawk. While presently a transient through the region, a pair or two Ospreys might become summer residents if a permanent and ample food supply comes into being. Possibly the Bald Eagle may be similarly affected since it is both a carrion eater and a fish eater.

As regards food supply this too works both ways. On the one hand indiscriminate shooting of rodents and lagomorphs, especially the more conspicuous diurnal forms such as ground squirrels, may deprive some raptors of potential food since most are meat eaters. On the other hand, the carrion eaters such as the vultures and bald eagles may receive a benefit through increased availability of carrion.

We are not aware of any special localized problem of pesticide usage that would affect the reproductive capacity of raptors in the Utah oil shale areas. However, one may develop in the Uinta Basin. If a city of about 6,000 people is established in the oil shale area, this might be an incentive for increased crop and food production in the Vernal-Jensen area and it is conceivable that pesticides and rodenticides might be used extensively to destroy crop pests, using chemical agents that would enter the food chain. Then with biological magnification, concentrations would be reached in end links such as ospreys, bald eagles and peregrines that would affect egg formation. The abundant presence of mosquitoes along the Green River bottomlands around Ouray is well known to all who visit the area in spring and summer. Eventually there will be mosquito control. Depending on what is used there may or may not be a pesticide problem for birds from mosquito control activity.

The most subtle of all the indirect effects will probably be the intangible effect of more humans and their activities in the region on the raptors. The effects will pertain not so much to the actual mining of the oil shale as it will to the increased traffic from trucks and automobiles and recreational activities such as hiking, picnicking, camping, canoeing and boating. How much of this raptors will tolerate and how much they will adjust is uncertain. This can only be ascertained by long-range follow-up studies involving keeping known eyries and nests under constant surveillance.

Although the intangible effects will be difficult to assess we feel that they will occur. It is a matter of weighing the values of vegetative and wildlife resources against the economic benefits to be gained from development of the oil shale resource. Some suggestions follow concerning further research on raptors and action to mitigate the effect of development on the birds of prey.

Recommendations

From our study we have the following suggestions to offer.

1. As regards the time factor, the present study, with limited funds available and only one full season and part of another, has nevertheless provided an initial inventory of the kinds present and at least a partial assessment of the population density of the kinds known to occur in the oil shale area. What is needed as a sequel is a long-range follow-up study, especially on population densities. Environmental conditions change quickly at times. For example the principal prey species in the region for the Golden Eagle seems to be cottontail rabbits. Rabbits undergo cycles. It will take several years of field studies to determine the relationship between the density of eagles and that of rabbits. It appears to us that during the interval of our study in 1974-75 the rabbit population was low.

Long-term residents of the area expressed the opinion that there are fewer eagles present in the region now than there were a few years ago. Golden eagles may have been more numerous when the density of lagomorphs was up.

2. Our results show that the greatest density of raptor populations occurs along the White River. In all probability, since much water will be needed for the kerogen extraction and development of townsites, there will be dams constructed along the river. We are not sufficiently acquainted with the geological and engineering factors involved in determining suitable dam sites, but we suggest that in the decision-making process the wildlife values, in this case that of the raptors, be taken into account. If there are alternate sites, one should be chosen that would result in the least habitat destruction and interference with the ecological requirements of the raptors involved.

3. For minimizing the direct, lethal effects on the raptors we suggest an early and vigorous educational campaign for new and old residents of the area informing them, through such approaches as posters, lectures and the presence of conservation officers, of the legal protection afforded the raptors under federal and state law along with stringent law enforcement. The economic and esthetic value of birds should be stressed and an appeal made for the public to desist from disturbing nests and young. Certain critical areas could even be closed to the general public. We have learned that canoeing parties of falconers discharge firearms periodically in the hope of flushing raptors from high cliff eyries. This should be discouraged.

Acknowledgments

In our study we have been helped by many individuals several of whom represent various state and federal agencies. We should like to express our appreciation to all of the following for their help. First we gratefully acknowledge the aid of personnel of the two sponsoring agencies, the Utah Division of Wildlife Resources and the Bureau of Land Management. For the

former, Earl A. Sparks, Environmental Specialist, has acted in a supervisory capacity. Field observations were furnished by Phil Wagner, Raptor Biologist, and Jeffrey Grandison, formerly Conservation Officer for the District, who is presently engaged in environmental impact studies in the area. For the Bureau of Land Management, Don Duff of the Salt Lake Regional Office has aided in an advisory capacity. Personnel of the Vernal Office, James Zumbo, Wildlife Biologist, has been especially helpful, furnishing transporation when needed, accompanying Mike Perry in the field and contributing various records of raptors they observed. Barry Betts of the U. S. Fish and Wildlife Service has helped in many ways. For the Utah Parks and Recreation Division we acknowledge the help of the Director, Gordon E. Harmston, who sanctioned Michael Perry's participation in the study during his off time when not engaged in his duties at the Natural History State Museum in Vernal; to Ivan Hall and Ernest Untermann who furnished much information on roads and topography of the region. Ivan helped on the canoe trips by dropping the parties off at the launching point and picking the men up at the termination point at the appointed times. Howard Mc Cowan, ranger at Steincker Reservoir, rescued us on one occasion when we suffered a breakdown far out in the remote back country.

Several students from the University of Utah helped in the field work from time to time. These were Jim Blanchard, Tom Boner, Bill Pingree and Dave Prowse. The canoe trips were the special responsibility of Tom Boner. Two falconers, James Hatchett and Michael Horton, contributed observations of raptors in the oil shale area as did Becky Surdick who was an observer on certain Division of Wildlife Resources field trips studying the raptors of the area. Bill Pingree spent many hours extracting from the literature data on food habits for the various kinds of raptors.

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APPENDIX I

Birds Other Than Raptors Observed in The Oil Shale Areas in Utah

Although no interest was expressed in the contract in birds other than raptors that occur in the oil shale areas, we nevertheless made incidental note of those kinds encountered in the field work on raptors. Our list will supplement the summary of birds occurring in the region given by Olsen (1973). Some of the species doubtless serve as food for raptors, especially the bird hawks (occipiters) and falcons. Small mammals, mostly rodents, which form a large part of the diet of the raptors are treated by Perry as a separate part of the contract.

Great Blue Heron (*Ardea herodias*): Uncommon summer resident.

Canada Goose (*Branta canadensis*): Common resident, nesting along White and Green Rivers, more common in migration.

Mallard (*Anas platyrhynchos*): Uncommon permanent resident and migrant.

Gadwell (*Anas strepera*): Uncommon transient.

Green-winged Teal (*Anas crecca*): Common transient.

Cinnamon Teal (*Anas cyanoptera*): Common transient.

Northern Shoveler (*Anas clypeata*): Uncommon transient.

Common Merganser (*Mergus merganser*): Uncommon transient.

Ring-necked Pheasant (*Phasianus colchicus*): Uncommon permanent resident.

Chukar (*Alectoris chuker*): Common permanent resident.

Sandhill Crane (*Grus canadensis*): Common transient.

Killdeer (*Charadrius vociferus*): Common permanent resident.

Spotted Sandpiper (*Actitus macularia*): Common summer resident.

Black-necked Stilt (*Himantopus mexicanus*): Uncommon summer resident.

Mourning Dove (*Zenaida macroura*): Common summer resident.

Common Nighthawk (*Chordeiles minor*): Common summer resident and transient.

White-throated Swift (*Aeronautes saxatalis*): Common summer resident.

Broad-tailed Hummingbird (*Selasphorus platycercus*): Common summer resident.

Common Flicker (*Colaptes auratus*): Common permanent resident.

Western Kingbird (*Tyrannus verticalis*): Common summer resident.

Ash-throated Flycatcher (*Myiarchus cinceraeus*): Common summer resident.

Say's Phoebe (*Sayornis saya*): Common summer resident.

Willow (Traill's) Flycatcher (*Empidonax traillii*): Common summer resident.

Horned Lark (*Eremophilus alpestris*): Common permanent resident.

Violet-green Swallow (*Tachycineta thalassina*): Common summer resident.

Tree Swallow (*Iridoprocne bicolor*): Uncommon transient.

Rough-winged Swallow (*Stelgidopteryx ruficollis*): Uncommon summer resident.

Barn Swallow (*Hirundo rustica*): Uncommon summer resident.

Cliff Swallow (*Petrochelidon pyrrhonota*): Uncommon summer resident.

Black-billed Magpie (*Pica pica*): Uncommon permanent resident.

Common Raven (*Corus corax*): Common permanent resident.

Pinon Jay (*Gymnorhinus cyanocephalus*): Common permanent resident.

Black-capped chickadee (*Parus atricapillus*): Common permanent resident.

Brown Creeper (*Certhia familiaris*): Uncommon winter visitant.

House Wren (*Troglodytes aedon*): Uncommon winter visitant.

Rock Wren (*Salpinctes obsoletus*): Common summer resident.

Mockingbird (*Mimus polyglottis*): Uncommon summer resident.

Sage Thrasher (*Oreoscoptes montanus*): Common summer resident.

American Robin (Turdus migratorius): Common permanent resident.

Mountain Bluebird (Sialia currucoides): Common summer resident.

Blue-gray Gnatcatcher (Polioptila caerulea): Common summer resident.

Ruby-crowned Kinglet (Regulus calendula): Common winter visitant.

Loggerhead Shrike (Lanius ludovicianus): Common summer resident.

Starling (Sturnus vulgaris): Common permanent resident.

Warbling Vireo (Vireo gilvus): Common summer resident.

Yellow Warbler (Dendroica petechia): Common summer resident.

Bay-breasted Warbler (Dendroica castanea): Accidental.

Common Yellow Throat (Geothlypis trichas): Uncommon summer resident.

Yellow-breasted Chat (Icteria virens): Uncommon summer resident.

American Redstart (Setophaga ruticilla): Uncommon summer resident.

House Sparrow (Passer domesticus): Common permanent resident.

Western Meadowlark (Sturnella neglecta): Uncommon permanent resident.

Red-winged Blackbird (Agelaius phoeniceus): Uncommon permanent resident.

Northern (Bullock's) Oriole (Icterus galbula): Common summer resident.

Brewer's Blackbird (Euphagus cyanocephalus): Common permanent resident.

Brown-headed Cowbird (Molothrus ater): Common summer resident.

Western Tanager (Piranga ludoviciana): Common transient.

Black-headed Grosbeck (Pheucticus melanocephalus): Common summer resident.

Lazuli Bunting (Passerima amoena): Common summer resident.

House Finch (Carpodacus mexicanus): Common permanent resident.

American Goldfinch (Spinus tristis): Common permanent resident.

Green-tailed Towhee (Chlorura chlorura): Common summer resident.

Rufous-sided Towhee (Pipilo erythrophthalmus): Common permanent resident.

Vesper Sparrow (*Pooecetes gramineus*): Common summer resident.

Lark Sparrow (*Chondestes grammacus*): Common summer resident.

Black-throated Sparrow (*Amphispiza bilineata*): Uncommon summer resident.

Sage Sparrow (*Amphispiza belli*): Uncommon summer resident.

Dark-eyed (Oregon) Junco (*Junco hyemalis*): Common winter visitant.

Chipping Sparrow (*Spizella passerina*): Common summer resident.

Brewer's Sparrow (*Spizella breweri*): Common summer resident.

White-crowned Sparrow (*Zonotrichia leucophrys*): Common transient.

Song Sparrow (*Melospiza melodia*): Common permanent resident.